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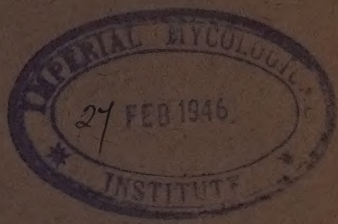

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DISEASES CAUSED BY BACTERIA AND FUNGI

GENEST, P., & NADEAU, J. D. (1944.) Observations, chez la poule, d'une épizootie due à Streptococcus zooepidemicus. **[Observations on an outbreak of streptococcus infection among fowls.]**—*Canad. J. comp. Med.* **8.** 342–349. [In French.] †1

This outbreak of streptococcus infection occurred in the region of Quebec and involved 20 premises and over 3,000 birds. Losses varied from 6–80% in these flocks. Sulphanilamide was effective in acute cases but less so in those having a sub-acute course. Eggs laid by hens treated with sulphanilamide had thin, rough shells. The outbreak was believed to originate in milk fed to these birds. Attempts to reproduce the disease did not prove successful when a culture of streptococci isolated from two dead birds was administered by intravenous, subcutaneous, nasal or oral routes. Sulphanilamide at the rate of 10 mg. per 100 ml. of broth inhibited growth at 37·5°C. and at 40°C., but at the rate of 50 mg. per 100 ml. was not bacteriostatic at 35°C. *Bacterium coli* and *Staphylococcus aureus* were helpful to the streptococcus on sulphanilamide agar but this influence was closely connected with colony size, the cultures employed, and especially the temperature.

[Although over 700 birds died in this outbreak the diagnosis seems to have been based on the isolation of a streptococcus from the bone marrow of two birds which were received dead at the laboratory. The suspicion that the outbreak originated from milk fed to the birds seems to be doubtful. Young birds kept separate from adults but receiving the same milk did not develop the disease. Attempts to isolate the streptococcus from the milk were negative, nor was it possible to infect birds in the laboratory by feeding milk. The lesions and the rapid spread are suggestive of a virus infection. No attempt seems to have been made to transmit the disease experimentally save by injection of cultures of the streptococcus and the feeding of the suspected milk.—ED.]—R. GWATKIN.

ROBSON, J. M., & SCOTT, A. A. B. (1944.) **Experimental streptococcal lesions of the rabbit's eye and their treatment.**—*Brit. J. exp. Path.* **25.** 81–90. 2

Lesions were produced by injecting broth cultures of haemolytic streptococci into the cornea of both eyes of rabbits. Only two strains of streptococci were found to produce suitable lesions. The action of chemotherapeutic substances was then investigated; in the case of local application, one eye only was treated, the other eye being used as a control. Each drug was tried out on a group of rabbits and the results were averaged.

Highly satisfactory results were obtained by the local application of penicillin preparations, but the sulphonamides were only effective when applied immediately after inoculation except when they were combined with the detergent, duponal; in this case good results were obtained when treatment was delayed for an hour. The action of propamide compared favourably with that of the sulphonamides but it produced marked irritation. Local application of the sulphonamides was more effective than systemic treatment.—H. WILLIAMS SMITH.

ANDERSON, E. O. (1944.) **Too little and too late.**—*Milk Plant Mon.* **33.** No. 4. 36–38, 40, 42 & 50, [Abst. in *J. Dairy Sci.* **27.** No. 9. A120–A121 copied *verbatim.*] 3

The author classifies the various types of mastitis and stresses the economic and public health importance of mastitis. Some mastitis milk may become a real public health hazard if it is not properly cooled. Increasing attention is being given to-day to the mastitis problem. The presence of mastitis organisms in milk should be determined as early as possible. Such tests as (a) leucocyte count; (b) examination of incubated milk for streptococci occurring in chains; (c) colonies produced on special media; (d) reactions to the Hotis test; and (e) isolation of the causative organism and identification by fermentation reactions and serological grouping, may be used. These tests are used in the Connecticut Plan for the control of bovine mastitis. The author lists seventeen suggestions for the prevention and spread of disease. In addition, he explains the use of chemotherapy in the control of infectious mastitis, which is briefly summarized under three conditions: treatment of milking cows, dry cows and those suffering from acute mastitis.

SANDERS, D. A. (1944.) **Mastitis in heifers following injury by the horn fly, Haematobia serrata Desv.**—*J. Amer. vet. med. Ass.* **104.** 284–285. 4

Arguments are presented which lend some support to S.'s view that the horn fly, *Lyperosia irritans*, may be of importance in the aetiology of mastitis in first-calf heifers in Florida. Cases occurred in beef heifers reared on the range as well as in dairy heifers which had been pail-fed. *L. irritans* frequently attacks the teats and udder in young heifer calves, causing erosions and excoriations. These were found on the tips and sides of the teats. The lesions healed as the calves reached breeding age but deformed teat sphincters and abnormal udder secretion developed as a result of the attacks. It is stated that at one dairy, control of the horn fly reduced the incidence of mastitis in first-calf heifers to negligible proportions.—M. LEVI.

MOSS, L. C. (1944.) **Bovine mastitis and milking practices.**—*N. Amer. Vet.* **25.** 281–284. 5

The problem of the control of mastitis in Honolulu is presented in this article from the hygienic point of view. M. believes that more emphasis should be placed on physical care of the udder and less on infection. In the herds under his control, cows are washed

* In certain cases it is not possible to check the titles of articles in the original publication. Such titles are marked with an asterisk.

thoroughly with warm water before milking. They are fed and washed in a separate byre, and milked in a milking parlour. The fore-milk is examined in a strip-cup, and there is an individual towel, wrung out in hypochlorite, for cleaning the udder of each cow.

Mastitis developed in these herds when, because of confusion after the Pearl Harbour attack, cows were not milked, or were improperly milked, this pointing to trauma as the primary predisposing cause.—I. W. B.

ANDBERG, W. G., & WEIRETHER, F. J. (1944.) **The incidence of bovine mastitis in Minnesota.**—*Cornell Vet.* **34.** 289–298. **6**

Milk samples from 1,660 quarters of 451 cows in 33 herds were examined by a modified Hotis method; of these 15·8% harboured *Streptococcus agalactiae* and 73·3% contained no pathogens.

Attempts were made to correlate clinical examination of the udder with the bacteriological findings at the time, but agreement was poor. Of 902 quarters clinically normal, 16·1% carried *Str. agalactiae*, which was also harboured in 38·7% of 473 clinically diseased quarters. The incidence of carriers of this organism was markedly higher in the older cows. An epidemic of sore throat in human beings was traced to a quarter affected with a Lancefield group A streptococcus.

—R. M. ARNOLD.

PORTELA, R. A. (1944.) Propiedades del extracto oleoso del bacilo de Koch. **[Properties of an oily extract of tubercle bacilli: possible use in diagnosis.]** —*Rev. Med. vet., B. Aires.* **26.** 131–155. **7**

Liquid paraffin containing killed tubercle bacilli of a virulent strain was incubated at 37°C. for five days; it was then centrifuged and the supernatant fluid, free from bacilli, was used to inoculate experimental animals. It produced lesions in rabbits, g. pigs and sheep and sensitized the animals to the tuberculin test, whereas liquid paraffin alone had no such effect. The allergy produced was just as intense as that stimulated by live bacilli or by aqueous suspensions of dead bacilli.

G. pigs sensitized in this manner can be usefully employed in the standardization of tuberculin, because it is possible to produce allergy in the animals rapidly, the allergy is uniform in all the animals and there is no danger in handling the animals. Dead bacilli in an oily base may also be used as a diagnostic agent for TB. in rabbits, by means of the intradermal test. The advantages of such a preparation are said to be rapid and economical production and constant strength.—I. W. B.

EGLI, H. (1943.) Kann aus einer positiven Mantoux-Tuberkulinreaktion ein Entscheid gefällt werden über das Vorliegen einer aktiven oder inaktiven Tuberkulose? **[Does a positive reaction to the tuberculin test indicate active or inactive TB.?]**—*Schweiz. med. Wschr.* **73.** 420–422. **8**

In experiments in a Zurich hospital, E. sought a method of TB. diagnosis which would distinguish active from inactive infections. A rise of temperature at the time of the Mantoux test was found to be a certain sign of active infection; there was no change of temperature in healthy patients so tested.—S. M. G.

SCHAMSCHULA, A. (1943–44.) Zum Einfluss der ausgebreiteten Tuberkulose auf den Fleischwert der Rinder. **[The influence of extensive TB. on the value of meat.]**—*Z. Fleisch- u. Milchhyg.* **54.** 45–46, 56–58 & 65–68. **9**

S. described in detail the pathology and condition of the flesh of 28 cows with extensive TB. He discussed pH and other characters and the loss of weight on cooking. The taste and appearance were poor in some cases. S. discussed the need for certain modifications of the German meat inspection regulations relating to such carcasses.—W. STROSS.

ZEISSIG, A. (1944.) **The results of retests on small-sized groups of tuberculin reactors.**—*Cornell Vet.* **34.** 345–354. **10**

Reactors to the tuberculin test were retested 2–6 weeks after the first test and were slaughtered and examined P.M. When more than five animals reacted in any herd the cause of the "break" was almost invariably infection with the tubercle bacillus; Z. examined in detail only those cases where five or less animals reacted. The thoroughness of the search for lesions was not stated nor was the infection typed as avian, bovine or human, but lesions doubtful macroscopically, were checked histologically. In all, 408 animals were retested and examined P.M. Of these, 26% were classified as tuberculous, 22% as having skin lesions and 52% as having "no visible lesions". The percentage of non-tuberculous animals was in inverse proportion to the size of the reactor group. The results of the retests are presented in tabular form to show their correlation to the original test and their association with P.M. findings and the size of the reactor group. In general, the severity of the reaction at the second test was far less in the skin lesion and "no visible lesion" groups. Twenty of 106 tuberculous cattle reacted to the first test but were negative when retested; three of these were considered "open" cases.—R. M. A.

BERGER, J. (1944.) **Tuberculosis of the genitalia in bovines and its implications.**—*Vet. Rec.* **56.** 469–470. **11**

B. comments and enlarges upon the findings of STEWARD [see *V. B.* **12.** 196] who found that 24 of 78 unselected samples of uterine discharges contained *Mycobacterium tuberculosis*. B. found *M. tuberculosis* in 12 of 128 cases (9%) of uterine discharges.

Although inflammation of the ovarian bursa is commonly associated with TB. and in many cases it was found to be affected, many of the cows excreting the organism showed no signs usually considered to be related to the disease.

B. stresses the danger of such cases of tuberculous endometritis to other cows, both in the same and in other herds, to the milk supply and to the obstetrician and calls for revision of the Tuberculosis Order (1938) to enable such animals to be compulsorily slaughtered.

—R. M. ARNOLD.

I. HEDVALL, E. (1942.) **Bovine tuberculosis in man. A clinical study of bovine tuberculosis, especially pulmonary tuberculosis, in the southernmost part of Sweden.**—*Acta med. scand. Suppl.* No. 135. pp. 1–196. [In English.] **12**

II. MAGNUSSON, H. (1942.) **The relation between bovine and human tuberculosis from the veterinary point of view.**—*Ibid.* pp. 199–239. [In English.] **13**

I. LINDAU, a bacteriologist, HEDVALL, a TB. specialist and MAGNUSSON on the veterinary side, collaborated in investigating the frequency with which bovine tubercle bacilli were the cause of pulmonary and other forms of TB. in man. The work was done during 1936–39 in the Province of Skåne in the south of Sweden. Sixty-seven cases of bovine TB. in man were studied closely and detailed case records and findings are given. A further 27 cases were found during the investigation but details of these are not included in the tables. In the 67 cases, bovine tubercle bacilli were isolated from the following sources:– sputum, 30; urine, 9; stomach washings, 8; abscess fluid, 4; pleural exudate, 4; cerebrospinal fluid, 3; cervical lymph node, 3; mesenteric lymph node, 2; tonsils, 2; kidney, 1; knee joint fluid, 1.

H. agrees that infection is generally brought about by ingestion but aerogenous infection cannot be altogether excluded. The highest incidence was in children especially from rural areas. Reference is made to ten outbreaks of the disease in epidemic form in various parts of Sweden, all of them traceable to TB. of the udder in the cow. It is not possible to differentiate infection with bovine type bacilli from infection with human type bacilli either from the clinical syndrome or by the use of tuberculin. Differential diagnosis is possible only by cultural and animal inoculation experiments.

H. urges that pasteurization regulations should apply to rural districts as well as to towns and advocates closer co-operation between doctors and veterinary surgeons.

II. M. gives an account of the veterinary side of the above investigation, and reviews the history of the control of bovine TB. in Sweden.

Efforts to control the disease were started in 1897. Slaughter was not compulsory except in the case of cows with tuberculous mastitis. Reactors were dealt with by Bang's method, but in many districts the incidence was so high that the method was impracticable. In 1932, after 35 years' work on these lines, only 159,802 cattle, a very small proportion of the total, were subject to control. Acts of parliament passed in 1934 and 1937 reorganized the work, providing for payment of subsidies and an additional price for milk from tuberculin-tested herds. As a result of these Acts, progress was made: as M. puts it, "The retrogression, stagnation or progression of the anti-tuberculosis campaign has always in the long run depended on economical factors. If the owner receives compensation for his losses he is always prepared to co-operate to the fullest extent". In 1935, 20% of the cattle in Sweden were non-reactors to the tuberculin test; by 1940, they had increased to 50%.

Funds are provided by means of taxation of imported concentrate foods and of the margarine industry, together with the higher price paid for milk. Progress was facilitated by using the single intradermal test with skin measurements at the time of injection and at the 72nd hour, instead of the old subcutaneous test. Immunization was also tried, first by use of the von Behring vaccine and then by BCG. Both were abandoned, von Behring's vaccine on account of the danger of excretion of the injected bacilli in the milk and BCG because the immunity could be broken down by massive infections and on account of practical difficulties in rearing calves in isolation and in feeding them boiled milk during the first months after vaccination.

At the present time, two methods of control are in use.

In Ostertag's method, open cases are detected by clinical and microscopical examination, special attention being paid to detection of cattle with TB. of the lungs, udder and uterus; such cases are slaughtered. This method is used in areas and herds with a high incidence of TB., and is regarded as preparing the way for complete eradication by Bang's method. At present, practically half the cattle in Sweden, about 1,500,000 head, are dealt with by Bang's method and the six northern counties and the Island of Gotland are practically free from bovine TB. The country is divided into tuberculosis free areas, protected areas and other areas. Great progress is claimed and prospects of complete eradication are said to be good.

Discussing the relationship between human and bovine TB. as disclosed by the investigation, M. states, "To sum up, it may be said the cattle can infect man only with the bovine type of bacillus, whereas man can infect cattle with both the bovine and human types of bacilli, but not with the avian type".

When reactors are found in a herd which has been free from TB. for some time and there is doubt as to the source of infection, retests are made using both bovine and avian tuberculins. If avian TB. is present the reaction to avian tuberculin is about twice as strong as to bovine. In such cases the only action taken is to remove the avian source of infection, after which no further reactions occur. If no difference in degree of reaction to the bovine and avian tuberculin is obtained, the practice is to use the subcutaneous test with bovine tuberculin in double the normal dose. Any animal which has previously reacted to the intradermal test and now reacts to the subcutaneous test is considered to be affected with the bovine type of bacillus. If the human type is present, it will be found that some of the animals which reacted to the intradermal test will not react to the subcutaneous. In such cases, steps are taken to discover and eliminate the source of infection. In cases of doubt, some of the least valuable reactors are slaughtered for P.M. examination.

The finding of focal TB. is taken to indicate bovine infection, as human and avian infections seldom give rise to macroscopic lesions. In both human and avian infections in cattle, the animals often cease to react to the test some months after the source of infection has been removed from the farm.

Histories are given of a number of cases of infection from cattle to man and from man to cattle. The most striking instance of infection from cattle to man was in the family of a small farmer. There were seven children varying in age from 12 years to 18 months. Six of the children became ill at about the same time. All the children, except the youngest, the only child not to fall ill, were in the habit of playing in the cattle shed and of drinking raw milk. Of five cows on the farm, three were open cases of TB., one of them having a tuberculous mastitis. Bovine tubercle bacilli were recovered from three of the children. The case of a milkmaid suffering from granular conjunctivitis from which bovine type bacilli were isolated is also described.

The examples of transmission of infection from man to cattle are divided into two groups, one concerning the transmission of human type infection and the other of bovine type. The features of the instances of infection with bacilli of the human type were that reactions occurred in herds which had had no reactors for some years and in the absence of any known introduction of infected cattle into the herd. The reaction to the intradermal test with bovine tuberculin was not very marked, there was no reaction to avian tuberculin and subsequent tests with double doses of bovine tuberculin given subcutaneously did not confirm the intradermal test results.

No macroscopic lesions were found on P.M. examination but bacilli of the human type were isolated through g. pigs by inoculation with lung and lymph node emulsions.

There are two examples of transfer of bovine type bacilli from man to cattle. A herd had not had any reactors for seven years but when tested in March, 1939, no less than 49 of the 74 cattle in the herd gave positive reactions, most of the reactors were cows. Only two of the young calves reacted. No cattle had been purchased, the herd being entirely self contained. Infection by separated milk returned from the creamery was ruled out as the calves fed on the separated milk were practically all negative. No cattle sold for slaughter during previous years had shown any lesions of TB. Clinical examination failed to detect any suspicious symptoms.

In the course of investigation it was found that one of the milkmaids had developed a cough and had been dismissed when this was diagnosed as TB. She had been milking the cows for a period of six weeks, some five months before the disease was detected in the cows. This milkmaid was shown to have extensive pulmonary TB. with cavitation from which she subsequently died, and very numerous bovine type bacilli in her sputum. The subsequent progress of the disease in the cattle is not known as they were all slaughtered on account of an outbreak of foot and mouth disease.

The second example concerned a herd of 118 cattle which had been free from TB. for a long time. The herd was free when tested on 8.5.40. The milkman was found to be affected with pulmonary TB. in October 1940, and tubercle bacilli of the bovine type were found in stomach washings. The herd was tested on 11.6.41 and a large number of positive reactions occurred. Investigations had not been completed at the time M. reported and it was not at that time possible to exclude entirely avian or human infection as the cause of these reactions in the cattle.

That pulmonary TB. in man has been shown to be due to bovine type bacilli much more frequently than was formerly supposed, emphasizes the fact that cattle may be infected by man, just as man may be infected by cattle. In M.'s opinion this indicates the need for intimate co-operation between doctors and veterinary surgeons and for legislation making it compulsory for dairy employees to submit themselves to medical examination where there is reason to believe that a herd of cattle may have been infected from a human source.

These measures are particularly necessary in areas where TB. has been eradicated from the cattle.—M. C.

JOHNSON, R. B. (1945.) **Studies on the complement fixation reaction as applied to bovine tuberculosis.** —*Cornell Vet.* **35.** 52–60. **14**

The results of tuberculin tests in bovine reactors and non-reactors were compared with complement-fixation tests carried out with sera from the same animals. A technique was used similar to that described by WITEBSKY, KLINGENSTEIN & KUHU (1931).

Sera chosen at random from 832 animals in New York State where the general incidence of TB. as revealed by tuberculin tests is less than 0·5% gave 61 reactors (7·3%) to the c.-f. test. Sera from 432 tuberculin-positive cattle were also tested. In 155 which showed macroscopic visceral lesions, 29% were negative; in 83 with skin lesions, 25% were negative; in 194 with no visible lesions, 49·5% were negative. J. concludes that, on the whole, the tuberculin test must still be regarded as a more efficient method of diagnosis of bovine TB. than the c.-f. test although the latter may have a limited value in picking out advanced cases of the disease.—R. E. GLOVER.

HOLTMAN, D. F. (1945.) **Corynebacterium equi in chronic pneumonia of the calf.**—*J. Bact.* **49.** 159–162. **15**

H. isolated *Corynebacterium equi* in pure culture from purulent lesions in the lungs of a six-month-old calf which had died from chronic pneumonia. He suggests that the name of this organism should be changed as it produces disease in other animals besides the horse.—H. WILLIAMS SMITH.

JENSEN, H. (1944.) Den intrapalpebrale Malleinprøves diagnostiske Vaerdi. **[Value of the intrapalpebral mallein test.]**—*Maanedsskr. Dyrlaeger.* **56.** 527–538. **16**

The superiority of the intrapalpebral mallein test to the ophthalmic test lies in the fact that a positive reaction is shown as a rule by marked changes of such a kind that accidental circumstances cannot obliterate them. The test possesses the further advantage that it can be employed even if the horse has slight conjunctivitis in both eyes, provided the animal's condition is noted beforehand.

A disadvantage of the intrapalpebral mallein test, as in the thermal test but not in the ophthalmic test, is that by its use antibody formation is induced, which causes the healthy horse to react positively to a complement-fixation test carried out subsequently.

Despite the defects inherent in biological tests, particularly the intrapalpebral mallein test, in view of the good results obtained by their use, they are of great value in the control of glanders. As a result of experiments conducted in Russia, preference has been given to this test in that country.

As an outcome of the application of the mallein test to horses in quarantine, out of 3,374 horses imported into Denmark only one animal has reacted positively. —R. PETER JONES.

NICOL, L., & MERCIER, P. (1944.) Sur quelques cas d'érysipéloïde à rouget chez l'homme, dont une réinfection. **[Cases of erysipeloid in man, including one reinfection.]**—*Bull. Acad. vét. Fr.* **17.** 189–192. Discussion p. 192. **17**

Infection in man with *Erysipelothrix rhusiopathiae* from sources other than the pig is discussed and illustrated by three original observations. In one case, infection arose following a scratch from a cooked rabbit bone. The rabbit from which the bone came had been reared in an old pig sty. In the second case infection followed a cut sustained during the P.M. examination of a serum-producing horse which had recently been injected intravenously with a culture of *E. rhusiopathiae.* This observation confirms the previous finding that swine erysipelas antiserum although having marked curative properties is not bactericidal. In the third case, one of the authors infected himself accidentally with a hypodermic needle contaminated with *E. rhusiopathiae,* and reinfected himself again two years later in the same way. Stovarsol appeared to be of value in treatment. —M. C.

SLASTNIKOV, I. F. (1940.) Reaktsiya agglyutinatsii pri infektsionnom rinite krolikov. **[Agglutination test in infectious rabbit rhinitis ("snuffles").]**—*Trud. Troitsk. vet. Inst.* No. 3. pp. 80–85. **18**

Both tube and slide aggln. tests are regarded as reliable and recommended for *intra vitam* diagnosis. Both methods agreed in 90·4% of cases tested. Normal rabbits did not show agglutinins against *Pasteurella lepiseptica* in the blood serum. After experimental infection, the agglutinins could be detected on the 5th–10th day.—A. MOLDAWSKY.

GWATKIN, R., & MOYNIHAN, I. W. (1945.) **Attempts to infect swine with Salmonella suipestifer cultures and necrotic material from the intestinal tract.**—*Canad. J. comp. Med.* **9.** 71–76. **19**

100 ml. of broth cultures of three recently isolated Canadian strains of *S. cholerae-suis* were given to pigs in their feed and proved to be innocuous. Eight strains from four sources in the U.S.A. were fed *via* a funnel and rubber tube in amounts of 50 ml. to eight pigs. One strain caused death in 24 days after feeding. Lesions resembling a slight case of necrotic enteritis were noted and the infective agent was recovered. Two other strains caused deaths in 11 and 6 days respectively. Two new animals given half the quantity of broth culture of these same two strains remained healthy. Necropsies of the surviving animals made 30–40 days after exposure were negative. An attempt to infect six pigs by feeding them necrotic intestines

and contents from four pigs which showed necrotic enteritis, but from which *S. cholerae-suis* could not be isolated, resulted in a transitory illness in only one pig. The results of the present and similar previous experiments indicate that the condition known as necrotic enteritis, which until recently was believed to be due to *S. cholerae-suis*, is in need of a new concept as to its aetiology.—J. L. BYRNE.

BOND, E. W. (1945.) **Trials with various preservatives for pullorum antigen.**—*Canad. J. comp. Med.* **9.** 40–42. **20**

On account of cloudiness which sometimes appeared in antigen diluted with 0·3% phenolized saline, work was undertaken with sodium borate, thymol, sodium benzoate, merthiolate, sodium sulphathiazole, citrinin, cetavlon and formaldehyde in an attempt to find a substitute for phenol; none of these substances proved satisfactory, however. They either failed to exert a preservative action or interfered with the agglutinability of the antigen.—R. GWATKIN.

VISWANATHAN, G. R. (1944.) **Brucellosis in animals and human beings in the Madras Presidency.**—*Indian vet. J.* **20.** No. 6. 234–243. **21**

For more than 20 years, bovine abortion has been reported in Madras villages. This is now known to be due to brucellosis, the disease having been confirmed in ten districts, with a particularly high incidence in jungle and hilly tracts. The course of the disease is as commonly described, except that in working bullocks synovitis is common. A few reactors have been found among buffaloes, sheep, and goats and there have been six cases of infection in man. Both tube and plate agglutination tests are used. Synovial fluid and milk are sometimes strongly positive, while positive results have also been obtained with placental fluids and uterine discharges. Three brucella strains have been isolated through g. pigs, but cultural methods have so far failed. It is stated that the use of a mineral mixture in the food from the fourth month of pregnancy onwards seemed to reduce abortion in several villages. Control measures are discussed.—J. B. POLDING.

KESSLER, W. R., & ZWEMER, R. L. (1944.) **Studies on experimental bartonella anemia in the albino rat. III. Potassium and other blood changes.**—*J. infect. Dis.* **75.** 134–137. [Authors' conclusions copied *verbatim*.] [For previous parts, see *V. B.* **14.** 297.] **22**

During acute infection with *Bartonella muris* in the adult rat there is a terminal increase in the plasma potassium level which occurs immediately before death. This may be a result of the red cell destruction. There is also an increase in the clotting time of blood of infected rats.

DUNCAN, J. T. (1945.) **Cultivation and identification of ringworm fungi.**—*Mon. Bull. Min. Hlth emerg. publ. Hlth Lab. Serv.* **4.** 93–97. **23**

Clinical and microscopic examination together enable a diagnosis of ringworm to be made, but specific identification of the fungus can only be accomplished by cultural methods. The collection of material for cultures and the sowing of cultures are described, and formulae for suitable media are given. Brief descriptions of the cultural characteristics of a large number of fungi give the reader a key to their identification.

—T. E. GIBSON.

APOLLOSOVA, P. A. (1941.) Izuchenie etiologii zabolevaniya loshadeĭ pod mestnym nazvaniem "sullyuk" v Uzbekskoĭ SSR. **[Studies on aetiology of "sullyuk" (broncho-pneumonia) in horses in Uzbekistan.]**—*Trud. XV Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [*Diseases of Horses.*] pp. 105–109. **24**

Mixed cultures of 38 fungi were isolated from the lungs, liver, spleen, kidneys, heart-muscle, and intestines of 52 affected horses which died or were slaughtered. Twenty-four of the fungi were identified as species of *Aspergillus*. Similar fungi were found in the fodder and soil of the farms on which the disease occurred.

Twenty horses and foals were experimentally infected by feeding and by intravenous inoculation with pure and mixed *Aspergillus* cultures, and clinical symptoms resulted which were similar to, but not identical with, those occurring in naturally affected horses. Although A. considers that further investigations are necessary, the condition appears to be due to fungus infection; the condition has a seasonal character which coincides with the maximal spread of fungi on certain farms. Contact infection is excluded.—A. M.

See also absts. **184, 189, 205** (TB.), **68–70, 205** (Johne's disease), **154** (joint-ill), **185, 186** (bacterial food poisoning), **205** (brucellosis), **72** (tetanus), **155–157** (clostridia), **158, 159** (epizootic lymphangitis), **143** (food poisoning in cattle and horses by *Claviceps*), **67** ("species antigens" in various bacteria), **189, 190** (culture media).

DISEASES CAUSED BY PROTOZOAN PARASITES

BLANC, G. (1940.) Leishmaniose viscerale generalisée observée chez un écureuil (*Xerus getulus* L.) au Maroc. **[Generalized visceral leishmaniasis in a squirrel (*X. getulus*) in Morocco.]**—*Arch. Inst. Pasteur Maroc.* **2.** 383–390. **25**

A fatal, spontaneous leishmaniasis was encountered in one of a batch of experimental squirrels (*X. getulus*) at the Pasteur Institute of Morocco, Casablanca, the organisms being present in the spleen, inguinal lymph nodes, liver, and lungs. The circumstances pointed to the infection as having been acquired at the laboratory, and to the possibility that the source of infection was a human or canine carrier. It is suggested that *X. getulus* may prove to be a valuable experimental animal for work on leishmaniasis.—U. F. RICHARDSON.

I. GARLICK, G. G., BARTLETT, D. E., & HAMMOND, D. M. (1944.) **Attempts to demonstrate passive immunity in bovine trichomoniasis.**—*Amer. J. vet. Res.* **5.** 14–16. **26**

II. BARTLETT, D. E., HAMMOND, D. M., & GARLICK, G. G. (1944.) **Attempts to develop active immunity to bovine trichomoniasis in breeding females by inoculation prior to breeding age.**—*Ibid.* 17–21. **27**

I. Four heifers were injected intravenously with serum or defibrinated blood from three cows considered resistant to *Trichomonas foetus* on the basis of initial infections and resistance to subsequent reinfection. Two untreated heifers and the four treated heifers were then inoculated intravaginally with *T. foetus* culture or mated with infected bulls; three of the four treated heifers later received further injections of serum. Subsequently all six animals were exposed to infection a second time. Both the controls became infected at the first exposure, and one at the second, by culture given intravaginally. No infection developed in two of the immunized heifers given culture intravaginally, while the remaining two became infected, one by culture given intravaginally, and one by infected coitus. To the second exposure, the two immunized heifers previously infected were resistant, one to intravaginal inoculation of culture and one to infected coitus, while

the two previously resistant became infected, one by infected coitus and one by intravaginal inoculation of infected preputial washings.

It is concluded that some passive immunity had been conferred which was, however, ineffective when the animals were exposed to infected coitus or preputial washings.

[There is an error in the table, the second exposure of heifer 178 being given as "coitus uninfected" instead of "coitus infected".]

II. Attempts were made to develop active immunity against *T. foetus* in two of the passively immunized and the two control heifers used in the previous experiment [see I above]. Each received 3–7 intravaginal inoculations of cultures or preputial flushings containing *T. foetus* during the 1–2 years before service with an infected bull. Two heifers, infected by the first intravaginal inoculation, became reinfected after their first service. Both had proved resistant on one or more occasions in the interval between the first intravaginal inoculation and coitus. One female, which had been infected by the first intravaginal inoculation, proved refractory to five of six subsequent inoculations and on three occasions when served by an infected bull. Infection, however, followed inoculation into the cervix of a culture of *T. foetus* in this animal. The fourth animal, infected by inoculation of preputial washings, was also infected as a result of coitus. This infection was benign, but a second service a year later produced a trichomonad pyometra.

It is concluded that, although a temporary resistance is conferred by several inoculations, this immunity will not protect animals against exposure to natural infection.—M. L. BINGHAM.

GAJEWSKI, J. E., & TATUM, A. L. (1944.) **A study of the mechanism of relapse in avian malaria.**—*J. infect. Dis.* **74.** 85–92. **28**

A consideration of the various procedures which have been described as predisposing to relapses, led the authors to study the effects on canaries with latent malaria of atmospheres of low oxygen content. An apparatus was used in which the air pressure could be controlled automatically. It was found that on exposure to an atmosphere with an O_2 content equivalent to approximately 75 mm. Hg partial pressure, all "latent" birds developed a relapse in 2–7 days. Not a single exception occurred in a series of well over 100 canaries. The parasite peak during relapse was much lower than in primary infection and deaths were rare, although death occurred in about 30% of birds in primary infection. When the parasites had disappeared from the blood stream and after an interval of several weeks the birds were exposed for a second time to the effects of low O_2 tension. This time only 50% of the birds relapsed. After recovery a third exposure failed to cause relapse. Of ten such birds which had failed to relapse on a third exposure, two were successfully reinfected by inoculation of infected blood. These two must have been cured by the experimental procedure.

When canaries which had been treated during the earliest stage of primary infection with plasmoquin, atebrin or quinine were subjected to low O_2 tension, they relapsed earlier and more severely, especially those birds which had been treated with plasmoquin. The mechanism by which such relapses are produced is discussed. The authors consider that the hyperglycaemia which occurs on exposure to low O_2 tension, inhibits phagocytosis and so brings about relapse.—M. C.

*ARCHETTI, I. (1941.) Sull'infettabilità dell'Aëdes albopictus nei vari stadi dell'infezione da Plasmodium gallinaceum nell'ospite vertebrato. [**Susceptibility of *Aëdes albopictus* to infection with *P. gallinaceum*.**] —*Riv. Parassit.* **5.** 77–84. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 295.] **29**

The gametocytes of *P. gallinaceum* appear in the circulation along with the schizonts whether the fowls have been infected with blood or with sporozoites. *Aëdes albopictus* can become infected by biting infected birds from the first day of the appearance of the parasites in the peripheral blood. Maximum infectivity is obtained on the fourth day after infecting fowls with blood and on the fifth day after sporozoite infection. There appears to be no relationship between the number of gametocytes in the peripheral blood and the infectivity of the mosquitoes.—C. HORTON SMITH.

*MUDROW, L. (1942.) Über die Entwicklung der Sporozoiten bei verschiedenen Vogelmalariaarten. [**The development of sporozoites in bird malaria.**]—*Riv. Malariol.* **21.** 29–46. [See also *V. B.* **14.** 411.] [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 287–288.] **30**

This new work on the early phases of the development of sporozoites relates primarily to the period 3–18 hours after infection and concerns especially *Plasmodium gallinaceum* and *P. praecox* [*relictum*] in addition to *P. cathemerium*. In all three kinds of bird malaria the development of sporozoites takes place in the same way, but the time taken varies. After introduction into the bird, the sporozoites develop only after remaining latent for several hours. Development proceeds in the interior of reticulo-endothelial and endothelial cells in the form of E-stages. In these cells the sporozoites assume a round form, grow in size, and become multinuclear schizonts. Earlier work is therefore confirmed.

—C. HORTON SMITH.

*ARCHETTI, I. (1941.) Conservazione di Plasmodium gallinaceum a bassa temperatura. [**Viability of *P. gallinaceum* at low temperatures.**]—*Riv. Parassit.* **5.** 247–249. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 295.] **31**

P. gallinaceum is insensitive to cold and retains its virulence even after chilling. A. was successful in keeping the plasmodia alive by freezing infected blood. 1 ml. of citrated blood containing 68% of infected erythrocytes was placed in a tube which was then placed in a large thermos flask with carbon dioxide snow, when the blood immediately froze. The plasmodia were killed by 70 but not by 50 days' exposure to the low temperature. Thawing was effected by placing the tubes in water at 37°C. Usually only half of the birds inoculated with the thawed blood became infected, and the same observation was made after only ten days' freezing. Death of birds successfully infected was not delayed. This method is recommended for keeping plasmodia viable for a long time if there is a shortage of animal material for subinoculation. In view of the fact that only half the birds become infected it is necessary always to inoculate several individuals.

—C. HORTON SMITH.

SEELER, A. O., & OTT, W. H. (1944.) **Effect of riboflavin deficiency on the course of *Plasmodium lophurae* infection in chicks.**—*J. infect. Dis.* **75.** 175–178. **32**

Riboflavin deficiency was found to decrease the severity of *P. lophurae* infections as estimated by parasite counts. When riboflavin was administered to riboflavin-deficient birds during the course of the infection, the severity of the infection was increased. The relatively high mortality observed in riboflavin-deficient groups was due to the inanition associated with the deficiency rather than to the malarial infection.

—C. HORTON SMITH.

*MOSNA, E. (1941.) Osservazioni sulle forme del ciclo esoeritrocitico del Plasmodium gallinaceum. [**Exo-**

erythrocytic forms of *P. gallinaceum*.]—*R. C. Ist. Sanit. pubbl., Roma.* **4.** 469–477. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 288–289.] **33**

The time of appearance of exo-erythrocytic forms of *P. gallinaceum* varies with the amount of material which is used for inoculation. In hens inoculated with infected blood taken during the acute phase of infection the exo-erythrocytic forms do not usually appear before the third or fourth week after inoculation, whilst these forms are already present in a relatively high percentage in birds which have been injected with blood taken in the fourth week after inoculation and are always present in hens infected with brain emulsion containing the exo-erythrocytic forms. M. considers it probable that exo-erythrocytic forms can be converted into endo-erythrocytic forms.—C. HORTON SMITH.

*CORRADETTI, A. (1941.) Ricerche sulla biologia del "Plasmodium gallinaceum" nei polli inoculati con sangue infetto. [**Biology of** *P. gallinaceum* **in artificially infected fowls.**]—*R. C. Ist. Sanit. pubbl., Roma.* **4.** 508–538. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 289.] **34**

The experiments described in this paper show that the exo-erythrocytic forms of *P. gallinaceum* can develop from the endo-erythrocytic forms and that the development of non-infectivity of the blood in animals inoculated with sporozoites furnishes no proof of the existence of a special cycle of these sporocytes.—C. HORTON SMITH.

*CORRADETTI, A. (1941.) Valore biologico del ciclo endoistiocitario del Plasmodium gallinaceum. [**Cycle of** *P. gallinaceum* **in the reticulocytes.**]—*Riv. Parassit.* **5.** 209–216. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 289.] **35**

This paper includes an account of C.'s observations and a survey of the literature. *P. gallinaceum* often attacks the reticulocytes and develops in these cells. These cells are attacked only if acquired immunity is absent or insufficient. It is not a case of a cycle of the sporozoites; the phenomenon can also be more readily provoked by merozoites resulting from schizogony, either of intra-erythrocytic or intrahistiocytic origin. This cycle is never the cause of relapses or of drug resistance of the parasites, as it is entirely transitory and disappears finally when immunity has been attained, *i.e.*, when equilibrium has been established between host and parasite. C. considers that recurrences depend exclusively on the erythrocytic cycle which continues throughout the duration of infection.—C. H. S.

MACHUL'SKIĬ, S. N. (1940.) Koktsidioz serebristochernykh lisits v Buryat-Mongol'skoĭ ASSR. [**Coccidiosis of silver foxes in Buryat-Mongol Republic.**]—*Veterinariya, Moscow.* No. 5. pp. 72–74. [French summary.] **36**

The faeces of two separate colonies of silver foxes were examined for coccidia. 10·3% and 31·5% respectively were found to be infected with *Isospora canivecolis*.
—L. LEVENBOOK.

LEVINE, P. P. (1945.) **Specific diagnosis and chemotherapy of avian coccidiosis.**—*J. Amer. vet. med. Ass.* **106.** 88–90. **37**

L. describes the macroscopic lesions produced by *Eimeria acervulina*, *E. brunetti*, *E. necatrix*, *E. tenella*, and *E. maxima* in fowls. The coccidiostatic properties of sulphur and of sulphaguanidine are also discussed.
—C. HORTON SMITH.

HEMMERT-HALSWICK, A. (1943.) Infektion mit Globidium leuckarti beim Pferd. [*G. leuckarti* **infection in the horse.**]—*Z. Veterinärk.* **55.** 192–199. **38**

The case described was that of an army horse which died after six weeks in hospital. No symptoms of the disease were noted, but P.M. examination revealed perforation of the stomach which was also congested. As the wall of the small intestine was much thickened, specimens were fixed for histological examination. Routine bacteriological examinations were made of the lungs, heart muscle, liver, spleen and kidneys, but no pathogenic organisms were found. Examination of the small intestine, however, showed that the villi had been heavily attacked by *Globidium leuckarti*. REICHENOW (1940) stored freshly passed oocysts at 20°–22°C. and found that the sporoblasts took 14 days to form, but at 26°C. they were formed in six days. Sporozoite formation is a slow process and at a temperature of 21°C., they require about three weeks to mature. Fresh infection cannot take place under three weeks from the time the oocysts are discharged in the faeces. The sporozoites penetrate the epithelial cells of the small intestine. The attacked epithelial cell rapidly increases in size and is pushed out of the epithelial lining towards the stroma of the villi, when the neighbouring epithelial cells grow over the parasitized cell. The attacked cell then becomes greatly enlarged and lies below the epithelium in the reticular tissue of the villi. In the case investigated, micro- and macrogametes as well as oocysts were found in various stages of development. The schizogonous development is not known. In sections the large microgametocytes which were very obvious and measured from $40\mu \times 50\mu$ to $170\mu \times 300\mu$, lay in the enlarged epithelial cells. Deeply staining granules occurred in the outer parts of the macrogametes. The oocysts were egg-shaped with the pointed ends somewhat flattened and they had a thick, slightly transparent, dark-brown wall provided with a micropyle. The mature oocysts were $80–87·5\mu$ long $\times$ $55–59\mu$ in breadth. There were considerable changes in the small intestine. The mucosa was folded and densely permeated with cells, especially with eosinophile leucocytes. Many of the villi were thickened and were largely devoid of epithelium; there was considerable congestion of the capillaries. The mucosa was coated with a deposit consisting of shed epithelium, eosinophile and basophile leucocytes, and a few lymphocytes. The submucosa was thickened and was densely permeated with eosinophile leucocytes. The serosa was chronically inflamed. The evidence suggests that *G. leuckarti* in the horse is undoubtedly of pathogenic importance.—C. HORTON SMITH.

DA SILVA LEITÃO, J. L. (1943.) A "Babesiella berbera" (Sergent e col. 1924) em Portugal. [*Babesia berbera* **infection in Portugal.**]—*Repos. Lab. Pat. vet., Lisboa.* **5.** 251–261. [English, French and German summaries.] **39**

Two outbreaks of *B. berbera* infection are reported, one in Chamusca which was found to be due to *B. berbera* alone and the other near Lisbon, which was found to be due to a mixed infection by *B. bigemina* and *B. berbera* in two bovines and to a simple *B. berbera* infection in three others. On the basis of dimensions of the sporozoa, the author considers that the forms isolated by him in Portugal belong to the highly virulent *B. berbera* (SERGENT *et al.*, 1924).—K. J. SINCLAIR.

RAGHAVACHARI, K. (1944.) **Theileriasis in calves.**—*Indian Fmg.* **5.** 208–209. **40**

An article in popular language in which calf theileriasis is referred to as a serious menace to calf-rearing in India. Transmission is through *Hyalomma aegyptium*. Symptoms and preventive measures are described. Emphasis is laid on the necessity for rotation of pastures.—H. N. RAY.

DAVID, W. (1943.) Spirochaeten und spirochaetenartige Gebilde bei Hühnern. [**Spirochaetes and**

spirochaete-like forms in fowls.]—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 232–233. **41**

As the symptoms described for fowl spirochaetosis closely resemble those of fowl plague and as it was thought that methods of transmission other than by ticks might exist and that the disease might be introduced into Germany from the East, an investigation was carried out in the Potsdam area on all fowls dying with symptoms of fowl plague. Fifty-four birds were examined but no cases of spirochaetosis were detected.

Spirochaetes were found in the intestine of one bird, but their movement was screwlike, and not whip-like as in *Spirochaeta gallinarum.* In two birds, dark-ground illumination revealed spirochaete-like structures in the blood and organs, but these proved to be the flagella of bacteria. By prolonged staining with Giemsa, bacteria with attached flagella were revealed, and also flagella which had broken away from the bacteria. In ordinary stained preparations, spirochaetes can be seen but bacterial flagella do not stain.—U. F. RICHARDSON.

KEAN, B. H., & GROCOTT, R. G. (1945.) **Sarcosporidiosis or toxoplasmosis in man and guinea-pig.**—*Amer. J. Path.* **21.** 467–483. **42**

A case of human disease is recorded in which autopsy revealed parasitic cysts within the swollen muscle fibres of the heart. These cysts were 50–60μ in diameter, and were packed with elongate bodies, averaging 5μ in length. They possessed a delicate capsule which was devoid of striation, and no internal septa could be demonstrated.

The literature on human sarcosporidiosis is reviewed, and it is pointed out that Darling accepted similar cysts in a human being as sarcosporidia, because he found that g. pigs fed on sarcocyst-infected rat muscle developed cysts similar to those found in the human case, and he believed g. pigs to be free from natural sarcosporidiosis. On checking this reputed freedom of g. pigs from these parasites, the authors found cysts resembling those depicted by Darling in 5 out of 60 g. pigs. The parasites were most numerous in the thigh muscles, but also occurred in the brain and kidney. It cannot, therefore, be accepted that Darling's cysts were the form that *Sarcocystis muris* assumes when developing in g. pigs.

The authors divide the reported cases of human sarcosporidiosis into two groups; group I with large cysts, striated capsule, and internal septa, is accepted as sarcosporidiosis, while group II with small cysts, unstriated capsule, and no internal septa, is considered to be probably toxoplasmosis rather than sarcosporidiosis, although in the absence of serological and inoculation experiments the possibility is not excluded of another parasite being concerned.—U. F. RICHARDSON.

See also abstr. **76, 161, 162** (malaria), **160** (surra), **163, 164** (piroplasmosis).

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

FRANCIS, T., Jr. (1944.) **Comments on immunity to virus diseases.**—*Yale J. Biol. Med.* **16.** 401–413. **43**

F. offers an explanation as to why the presence of circulating antibodies is associated in certain diseases with prolonged immunity and in others with transient resistance. The significance of the circulating antibodies must be considered together with the pathogenesis of the particular infection. Where antibodies are readily available the virus is prevented from establishing itself either locally or at a distant point and immunity results, as for example in the case of introduction by a mosquito of yellow fever virus into the blood of an individual possessing circulating antibodies. If the antibodies are not effective at the portal of entry but are present in the circulating blood, infection can take place with or without characteristic signs of the disease: in the exanthemata of virus origin, for example, diagnosis is largely based on the appearance of an eruption in a tissue possibly remote from the portal of entry of the virus and if this eruption does not reappear, an impression of unfailing immunity is obtained, although a modified infection may have occurred; it is suggested that smallpox or measles may occur without a rash. When the injury at the portal of entry constitutes the essential manifestation, both infection and clinical disease occur, although the latter may be limited in extent: in influenza and the common cold the primary injury is to superficial cells which may not be readily accessible to circulating antibodies and in these two diseases repeated infection occurs.

Another factor influencing the duration of immunity is the homogeneity of the virus involved. The differentiation of some viruses into types showing no cross-immunity provides an explanation for repeated attacks of the same clinical disease. Variations of strains within the type contribute a further risk, as with type A influenza virus.

F. opposes the view that the duration of immunity depends upon the maintenance of the virus within the host. In the group of infections in which the virus can be shown to persist, *e.g.*, psittacosis, lymphocytic choriomeningitis, mouse pneumonia, lymphogranuloma venereum and herpes, an outstanding feature is that although individuals may resist further inoculation, instead of presenting a prolonged and solid immunity they are marked by a tendency to relapse when subjected to physiological insults. The supposed immunity represents a state of tolerance or non-reactivity to further introduction of the same agent.

F. emphasizes that special conditions alter results and that many of the statements concerning the effect of immunizing procedures and the significance of the antibodies produced may be based upon insensitive techniques and upon drastic tests of resistance greatly dissimilar to the usual mechanisms of infection.

—W. M. HENDERSON.

HEATH, L. M. (1945.) **A note on the absence of hemagglutinins in certain viruses.**—*Canad. J. comp. Med.* **9.** 82–83. **44**

Haemagglutinins were not found in the viruses of ferret distemper, equine encephalomyelitis (Western) or lymphocytic choriomeningitis for the washed red blood cells of a horse, a cow, a sheep, a ferret, a rabbit, a g. pig and a cockerel, neither did swine fever virus agglutinate the r.b.c.'s of a cockerel. Pooled fresh sera from healthy pigs haemolysed the erythrocytes of a cockerel. This property was destroyed by inactivation and by aging in the refrigerator.—P. J. G. PLUMMER.

MICHELSEN, E. (1944.) Om Mund- og Klovesygevirustyper og Typedifferentiering. [**Foot and mouth disease virus types and type differentiation.**]—*Maanedsskr. Dyrlaeger.* **56.** 297–313. **45**

M. refers to the theory of VALLÉE & CARRÉE on plurality of virus types, which was confirmed by the investigation of WALDMANN & TRAUTWEIN (1926). [Of 104 virus strains examined by TRAUTWEIN, 76 were O, 9 A, and 19 C strains. Of 20 strains examined by VALLÉE, 16 were O and 4 A strains. Of 17 English strains 16 belonged to type O and one to type A. In Denmark also type O is the most general.] Recent experience in Germany and England indicates that

virus structure may be of complex nature as two or possibly more types may be combined.

Changes sometimes occur within the type itself with regard to its immunizing properties, so that although it may possibly still be referred to one of the three classic types, it can nevertheless break through the immunity produced by a corresponding standard type.

The theory that the standard virus itself exhibits several antigens agrees well with German investigations in which it was proved that type specificity is not absolute. Four methods of type determination are described. Of the pathogenic samples received at Lindholm from 1937–44, none proved to be variants in type determinations.—R. PETER JONES.

RAMON, G., & LEMÉTAYER, E. (1943.) Préparation chez le cheval au moyen de l'ultravirus et de l'anavirus aphteux d'un sérum possédant des propriétés neutralisantes et préventives à l'égard de l'agent de la fièvre aphteuse. **[Foot and mouth disease antiserum prepared in horses.]**—*Bull. Acad. vét. Fr.* **16.** 366–374. Discussion pp. 374–375. **46**

This is a fuller account of an experiment already published [see *V. B.* **14.** 7]. The authors, having detected neutralizing antibodies in the serum after repeated inoculation of one horse with an inactivated virus suspension, suggest that here is a safe method for the preparation of F. & M. disease antiserum by the use of such non-infective material in insusceptible animals.—W. M. HENDERSON.

FRITZ, W. E. (1944.) **Bovine rabies.**—*Cornell Vet.* **34.** 260–262. **47**

Three cases of rabies occurred in a herd of 15 heifers at pasture. They were not known to have been bitten but three other cases had occurred a week earlier in cattle on an adjoining farm. The symptoms are described. Characteristic symptoms included abdominal straining and inability to drink in spite of avid attempts to do so. Three more cases developed a month later and F. suggests that they had been infected by ingestion of hay or water contaminated with saliva by the earlier cases. Only one of the six affected animals made any attempt to bite.

F. recommends vaccination in such outbreaks but does not state whether vaccine was used in the outbreak described.—M. C.

DURAND, P. (1941.) Deux cas de rage humaine a forme méningée; caractères particuliers du virus; remarques sur les réactions méningées au cours de la rage animale, naturelle ou expérimentale. I. Etude clinique. II. Isolement et propriétés des virus. III. Fréquence des réactions méningées au cours de la rage animale. **[Two cases of rabies in man contracted from a vaccinated dog. I. Clinical study. II. Isolation and characters of the virus. III. Meningitis in rabies in animals.]**—*Arch. Inst. Pasteur Tunis.* **30.** 55–76. **48**

IV. PÉRARD, C. (1944.) Transmission de la rage à l'homme par un chien vacciné. **[Transmission of rabies to man by a dog which had been vaccinated.]** —*Bull. Acad. vét. Fr.* **17.** 46–48. **49**

I. D. discusses two cases of rabies in human beings, in which the source of infection was believed to be a dog which had been vaccinated against rabies nine months previously and which was alive and in good health after the two people had died. A nurse at a hospital had been bitten on the lip by her dog. Treatment was started but was stopped after four injections as the dog did not show any symptoms of rabies. Thirteen days after being bitten she developed symptoms of meningitis and died after an illness lasting six days.

A gardener at the same hospital who had frequent contact with the same dog, but who was not known to have been bitten was admitted to hospital three months later in a state of coma and died. In each case rabies virus was demonstrated in the brain by animal inoculation and cross-immunity tests. Negri bodies were absent in both cases but developed in experimental animals after a number of passages.

Unusual features of these cases were that the dog which was presumed to have been the source of infection was alive and well after both patients had died; that it had been vaccinated nine months previously by two injections of an ether-treated vaccine and later proved to be immune to rabies by a test inoculation; that the period of incubation in the first human case was exceptionally short if the suspected dog was actually responsible, and that the symptoms were those of a meningitis without paralysis and the lesions were those of meningitis.

II. The behaviour of the rabies virus in a variety of experimental animals (g. pigs, rabbits, dogs, sheep, rat, ass, cat, calf, pig, etc.) is described. In all cases the period of incubation was extremely short. Negri bodies were not seen in the earlier passages. Cross-immunity tests indicated that the virus was a rabies virus.

III. The characters of the cerebrospinal fluid in cases of experimental rabies are described and compared with those in cases of natural rabies in seven dogs and one calf.

IV. In discussion of the cases described by DURAND [see 1, above] P. concludes that the suspected dog had become a carrier of rabies as a result of vaccination.

[That these two human cases had been infected by the vaccinated dog appears to be very doubtful. No mention is made of any attempt to prove that the dog was a carrier of infection by destroying it and using its brain for test inoculation of experimental animals. The possibility that infection had been contracted from some other source cannot be excluded. Rabies is said to be common in the district and the nurse had tended human cases in the hospital.]—M. C.

GHAURI, K. A. (1944.) **A case of hydrophobia.**—*Indian vet. J.* **21.** 165–167. **50**

An account is given of a fatal illness in a man in which the history and symptoms, some details of which are given, were strongly suggestive of rabies.

—D. A. MUNRO.

BURNET, F. M. (1945.) **An unsuspected relationship between the viruses of vaccinia and infectious ectromelia of mice. [Correspondence.]**—*Nature, Lond.* **155.** 543. **51**

Suspensions of the virus of infectious ectromelia derived from the liver and spleen of infected mice or from the chorioallantoic membrane of infected eggs have the capacity of agglutinating fowl erythrocytes. As in the case of vaccinia virus, only 50% of fowls provied susceptible cells, this 50% being made up of the same individual fowls in the case of each virus. Agglutination by the virus of infectious ectromelia is inhibited by anti-vaccinial calf serum. It is suggested that infectious ectromelia is the murine representative of the mammalian pock diseases.—J. B. BROOKSBY.

MITCHELL, C. A., & PULLIN, J. W. (1944.) **Diagnosing western equine encephalomyelitis infection. Comparison of neutralization and complement fixation tests.**—*Canad. J. comp. Med.* **8.** 259–260. **52**

Results did not show that there was agreement between the neutralization and complement-fixation

reactions, although reactions to both test methods were generally found where encephalomyelitis had been known to exist. Experience with this and similar viruses suggests that positive serum neutralization results indicate that a virus has been present in the tissue. The authors believe that the complement-fixation reactions were due to a combination with the virus, or some non-specific substance resulting from specific virus infection, but more work is required before the complement-fixation method can be accepted as a specific technique for the diagnosis of encephalomyelitis in man or animals.—R. GWATKIN.

SULKIN, S. E. (1945.) **Recovery of equine encephalomyelitis virus (western type) from chicken mites.**—*Science*. **101.** 381–383. **53**

Chicken mites (*Dermanyssus gallinae*) were collected from fowls on one farm in Texas where E.E. had occurred. They were ground in a mortar with broth, and after centrifugation the supernatant fluid was injected into Swiss mice and g. pigs. An infection was produced which was shown by serum neutralization tests to be due to the Western type of E.E. virus.

Fowl ticks (*Argas persicus*) collected from the same farm yielded negative results. Sera were obtained from seven hens on the same farm; three were shown to contain neutralizing antibodies for the Western E.E. virus.

Attempts to isolate virus from specimens collected at eight other farms were negative.—F. D. ASPLIN.

FLÜCKIGER, G. (1943.) Über die Massnahmen der zivilen Behörden zur Bekämpfung der infektiösen Pferdeanämie in der Schweiz. **[Civil Government measures for the control of equine infectious anaemia in Switzerland.]**—*Schweiz. Arch. Tierheilk.* **85.** 18–24. **54**

A brief account of the control of E.I.A. in Switzerland, up to the order of January 1943, under which compulsory notification is enforced.—J. B. BROOKSBY.

LEMÉTAYER, E. (1944.) Les polynucléaires dans l'anémie infectieuse des equidés. **[Polymorphonuclear leucocytes in equine infectious anaemia.]**—*Bull. Acad. vét. Fr.* **17.** 218–224. **55**

L. discusses the wide variation recorded in the literature with regard to the blood picture in E.I.A. and points out that during the course of the disease the temperature rises and falls many times and the blood picture varies at the time of crisis and during periods of remission. L. studied the leucocytic picture in an experimental case and correlated it with the periods of crisis and remission as revealed by the temperature chart. There was a neutrophilia during the periods of attack of fever; the curve of the daily polymorph count kept parallel to that of the temperature, but changes in the polymorph curve took place 24 hours before the corresponding changes in temperature. Concurrent with the neutrophilia noted during fever, cosinophiles disappeared from the circulation but reappeared after the attack. During the remission period a neutropenia is observed and if this period is prolonged there is a gradual return to the normal leucocytic picture. In latent infections the leucocytic picture is normal or a more or less clearly defined neutropenia is seen. A single blood examination is of little assistance in the diagnosis, but repeated examinations made at times carefully chosen after a study of the temperature curves may give assistance in diagnosis.—T. E. GIBSON.

MACGREGOR, A. D. (1944.) **A preliminary note on cutaneous rinderpest.**—*Indian J. vet. Sci.* **14.** 56–58. **56**

This article describes the occurrence in Bengal of a mild alimentary rinderpest with typical mouth lesions, associated with cutaneous nodules all over the body. With the progress of the disease these nodules form scabs which are infective for more than three weeks; this longevity of the virus is explained as the cause of "spontaneous" rinderpest. The cutaneous eruptions are said to cause great damage to the hides, reducing their value by 40%.—C. SEETHARAMAN.

BAWA, H. S. (1944.) **Some observations on 'wah' of goats and sheep in Sind.**—*Indian J. vet. Sci.* **14.** 105–110. **57**

B. records a disease of goats and sheep in India simulating agalactia contagiosa and in which the mammary gland and joints are affected. The vernacular term "wah" means rheumatism.

The disease is usually chronic in tendency but may be acute or subacute. There is an acute mastitis, the milk being altered in quality and in quantity, and painful swellings of the knee and hock joints appear with severe lameness. The udder is permanently damaged, while the joints become normal in about three months. Mortality varies between 10 and 30%.

Bacteriological examination revealed no pathogenic organisms. In attempts to reproduce the disease in goats by the injection of blood, milk, urine, faeces and joint fluid from affected animals, milk alone was found to be infective after an incubation period of 10–13 days, when given intramuscularly or by the teat canal. Attempts at filtration were not possible, but the causal agent is probably a virus.—J. A. IDNANI.

—. (1945.) **Scrapie.**—*Canad. J. comp. Med.* **9.** 1. **58**

Within the last six years scrapie has been diagnosed in three Canadian flocks. It has not been reported previously as existing in North America.—P. J. G. P.

LUCAS, A. M., & RISER, W. H. (1945.) **Intranuclear inclusions in panleukopenia of cats. A correlation with the pathogenesis of the disease and comparison with inclusions of herpes, B-virus, yellow fever, and burns.**—*Amer. J. Path.* **21.** 435–465. **59**

Material was examined from natural and experimental cases of panleucopenia of cats. In the later stages of the disease, hyperaemia of the gastro-intestinal tract and of the associated lymph nodes was found on P.M. examination. Histologically, there was a disappearance of lymphoid cells from the stroma of the lymph nodes with a quick return to normal after the crisis had passed, and a severe phagocytosis of red cells.

Two types of granular inclusion body, termed "clustered" and "diffuse" respectively, were found resembling those encountered in yellow fever. The stages in the cycle of development from the granule to the fully formed inclusion body are described in detail. In addition, homogeneous inclusions, apparently derived from plasmosomes, can be distinguished from the granular inclusions. The relationship of plasmosomes to *bona fide* inclusions is discussed.—R. E. GLOVER.

HERZBERG, K. (1942.) Kultur des filtrierbaren Mäusepneumonieerregers "Ib". IV. Mitteilung. **[Research on influenza. IV. Culture of a filtrable causal agent "Ib" of "mouse pneumonia".]**—*Zbl. Bakt. I. (Orig.).* **149.** 362–366. [For previous parts, see *V. B.* **12.** 447.] **60**

Attempts to culture "Ib", one of the causal agents of mouse pneumonia which had been isolated in work on influenza, proved unsuccessful aerobically or anaerobically on agar or blood agar, on broth, glucose broth, liver broth, serum broth or serum agar.

In serum broth an opalescence occurred, but no organisms could be definitely identified. Growth was obtained on inspissated Löffler-serum sloped in tubes, colonies being visible with the magnifying glass in seven days, appearing as slightly raised island-like areas.

In these colonies the agent appeared in the form of cocci, rings or threads. The other causal agent of mouse pneumonia, strain "VI", was also cultivable on Löffler-serum slopes, and subcultures of both strains could be obtained. The optimum incubation temperature was 37°C., but growth occurred as low as 27°C. Intranasal administration of strain "VI", in a third generation culture, failed to kill a mouse.—U. F. R.

GROSS, W. O. (1942.) Eine Mäusepneumonie und ihr Erreger "Schandau". **[A "mouse pneumonia" and its causal agent "schandau".]**—*Zbl. Bakt. I.* (*Orig.*). **149.** 366–380. **61**

The name "schandau" was given to an infective agent isolated from a disease of mice characterized clinically by loss of hair, a matted coat, gummed eyelids and nervous symptoms. Inoculation of the agent into the lung produced an acute pneumonia, but after intranasal infection a chronic lung disease developed with purulent foci which histologically resembled the necrotic pneumonic lesions of human influenza.

The agent was filtrable with difficulty through Berkefeld V candles, maintained its infectivity for 14 days at 4°C. and was not removed from fluid by centrifuging for 15 min. at 3,000 r.p.m., but was largely removed at 12,000 r.p.m. It resembled "Ib" morphologically and in cultural characteristics, producing on inspissated Löffler-serum two types of colonies, a dry type which was avirulent and a moist type which caused the chronic type of disease on inoculation. These moist colonies did not appear in sub-cultures.

Immunity could be produced by inoculating infective material by various routes. Mice immune to the strain "Ib" were also immune to the "schandau" strain, but mice immune to "schandau" were not immune to "Ib". It is suggested that the strain "Ib" consists of two constituents.—U. F. RICHARDSON.

GROSS, W. O. (1942.) Der Mäusepneumonieerreger "Greifswald". **[The "mouse pneumonia" causal agent "greifswald".]**—*Zbl. Bakt. I.* (*Orig.*). **149.** 380–386. **62**

On the assumption that the causal agent of mouse pneumonia, "Ib", consisted of two components, "schandau" and an unknown agent, a strain of infection was isolated from "schandau"-immune mice inoculated with "Ib". This strain, which was named "greifswald", was assumed to be "Ib"–"XV" (the "schandau" strain to which the mice were immune).

Experiments on cross-immunity showed that "greifswald" had no immunological relationship to "schandau", but that mice immune to "Ib" were immune to "greifswald", whilst the converse did not hold true.

In this work it was found that immunity could be conferred conveniently by subcutaneous or plantar inoculation of the agent. The "greifswald" strain differed from the "schandau" strain in that it did not produce colonies on Löffler-serum, was more difficult to remove from fluid by centrifugation and survived longer at 4°C. Microscopically the agent could not be identified. It passed through Berkefeld V filters with difficulty, thus differing from the influenza virus.

—U. F. RICHARDSON.

HERZBERG, K. (1942.) Mikroskopische Darstellung des filtrierbaren Mäusepneumonieerregers "Greifswald". **[Microscopic description of the filtrable causal agent "greifswald" of "mouse pneumonia".]**—*Zbl. Bakt. I.* (*Orig.*). **149.** 386–389. **63**

H. records that by searching many preparations from passages of "greifswald" mouse pneumonia he was able to detect the causal agent as cocci, rings and thread forms similar to the forms described for "Ib", but more delicate. The organisms occurred in preparations from the lungs, but could not be identified in blood smears. There was no trace of development of this strain on Löffler-serum cultures.—U. F. R.

GROSS, W. O. (1942.) Der Ursprung des von Herzberg und Gross auf Mäuselungen isolierten Erregers "Ib". **[The origin of the causal agent Ib of "mouse pneumonia".]**—*Zbl. Bakt. I.* (*Orig.*). **149.** 389–395. **64**

The further cross-immunity work here recorded tends to confirm that the "Ib" strain of mouse pneumonia is a compound of the strains "schandau" and "greifswald". Discussing the origin of these strains, G. suggests that the "schandau" and "greifswald" strains may occur as latent infections, but when mice are used for influenza work and such strains are passed through a series of mice, the two may become mixed and produce severe disease. G. argues that the evidence points to their origin in mice and not to their origin from human oral washings.—U. F. RICHARDSON.

HOFSTAD, M. S. (1945.) **A study of infectious bronchitis in chickens. I. The pathology of infectious bronchitis. II. Observations on the carrier status of chickens recovered from infectious bronchitis.**—*Cornell Vet.* **35.** 22–31 & 32–40. **65**

I. Virus from a typical field outbreak was passaged by the intratracheal inoculation of tracheal exudate from the diseased birds. Of a batch of 75 three-week-old chickens inoculated in this way, all showed symptoms lasting from about the 18th to the 180th hour after inoculation. By the 204th hour all chickens appeared normal. Birds killed for examination during the course of the disease showed no pathognomonic lesions. Tracheitis and inflammation of the larger bronchi were present, the tracheal mucosa being thickened, oedematous and infiltrated with leucocytes. In the experimental cases studied the epithelium remained intact and the lumen free from cells. After 144–180 hours, regression of the lesions took place. In field cases, a fibrinous inflammation of the air sacs was commonly present, and the tracheal lesions were complicated by exudation into the lumen. In fatal cases a plug of disintegrating cells and fibrin was frequently found blocking the air ducts.

II. No carriers could be found among groups of 21 and 26 birds recovered from experimental or field infection for three and two months respectively and then exposed to groups of healthy birds. Experiments in which the conditions of management of the birds were bad, and in which healthy birds were exposed to recovered birds in pens which had not been cleaned since the birds were diseased also failed to demonstrate carriers.—J. B. BROOKSBY.

SAWYER, W. A., MEYER, K. F., EATON, M. D., BAUER, J. H., PUTNAM, P., & SCHWENTKER, F. F. (1944.) **Jaundice in army personnel in the western region of the United States and its relation to vaccination against yellow fever. (Part I.) (Parts II, III and IV.)**—*Amer. J. Hyg.* **39.** 337–430, and **40.** 35–107. **66**

I. Extensive evidence, obtained largely by the questionnaire method but supported by field and laboratory studies, is brought forward in an attempt to define the epidemiology of a serious and widespread series of outbreaks of jaundice which originated in California. The determining factor in all outbreaks seems to have been the time when certain lots of yellow fever vaccine were administered. The mean intervals between vaccination and onset (from 3 to 6 months according to the vaccine) remained almost constant, while in most

instances, thes tandard deviations of the interval distributions were significantly smaller than those of the onset distributions. Data on the case rates per dose issued, on the case fatality rate and on the other possible aetiological factors, most of which are almost certainly excluded, are discussed in detail.

II & III. A detailed account is given of research into the nature of yellow fever vaccine and its relationship to infective hepatitis and of a laboratory search for the aetiological agent of infective hepatitis.

IV. The findings and recommendations are summarized. Attempts to isolate an icterogenic virus were negative, while leptospiral jaundice was ruled out. The fact that yellow fever vaccine may now be prepared without the incorporation of human serum is held to be a complete solution to this particular problem, although no further light has been thrown upon the prevention of jaundice following the inoculation of human plasma or serum, or of other products containing these.—A. N. WORDEN.

See also absts. **41** (fowl plague), **71** (immune body treatment of virus and rickettsial diseases), **104** (virus of fowl paralysis), **200**, **204** (rinderpest), **205** (vesicular stomatitis in pigs in the U.S.A., equine infectious anaemia).

IMMUNITY

DAY, H. B. (1944–45.) **Studies on immunization by a species antigen. II. The presence of "species antigen" and of "opposition factor" in bacteria other than pneumococci. III. The presence of an anti-immunity factor in** *Pneumococcus.*—*J. Hyg., Camb.* **43.** 330–336, and **44.** 143–148. [For part I, see *V. B.* **14.** 11.] **67**

II. The first article in this series described the preparation from pneumococci of a "species antigen" capable of producing immunity in mice against all types of pneumococci. Using the same extraction methods, preparations from examples from widely different classes of bacteria were proved to be capable of inducing immunity in mice against pneumococci. The success of these preparations was found to depend on the differential separation of an active immunizing antigen from a protein constituent containing an "opposition factor" which interferes with immunization. The organisms examined included several strains of *Streptococcus haemolyticus, Staphylococcus aureus,* a meningococcus, a gonococcus, a strain of escherichia, *Bacterium friedländeri, Haemophilus pertussis, Pseudomonas pyocyanea, Mycobacterium tuberculosis* and *Mycobact. lysodeikticus.*

III. The type-specific antigen of pneumococcus is contained in the capsule; it dissolves out in the early stages of autolysis and can be isolated free from other constituents of the organism. The "opposition factor", a protein constituent, and the species antigen, apparently of carbohydrate nature, are contained in the body of the organism; they are liberated together in the advanced stages of autolysis or by the action of bacterial solvents and are difficult to separate; it was found impracticable to obtain the "opposition factor" free from the species antigen.

D. describes experiments measuring the degree of type immunity induced by the injection of type-specific antigen and any variation produced by the presence of other pneumococcal constituents. A solution of type antigen (a taurocholate preparation) had much greater immunizing value than a comparatively insoluble preparation (acid-treated) containing the same amount of antigen, it being shown that equivalent treatment with acid and alkali had no deleterious effect on the antigen. The anti-immunity factor in the residual coccal bodies was heat-stable at acid pH and was strong enough to reduce the immunizing effect of type-specific antigen. In heat-killed pneumococci the coagulation of the protein renders the anti-immunity factor relatively insoluble and minimizes its action.—W. M. HENDERSON.

JOHNSON, H. W. (1944.) **Studies on johnin. III. Multiple testing on sensitized cattle as a method of studying johnin potency.**—*Amer. J. vet. Res.* **5.** 179–188. [For parts I & II, see *V. B.* **13.** 5.] **68**

KUMMER, F. A., & JOHNSON, H. W. (1944.) **Studies on johnin: IV. Dermal thickness gage.**—*Ibid.* 189–192. **69**

JOHNSON, H. W. (1944.) **Studies on johnin. V. Producing and standardizing a potent product.**—*Ibid.* 320–328. **70**

III. Cattle, two years old or over, were sensitized to *Mycobacterium johnei* by the intraperitoneal injection of 3 g. of moist, viable organisms in 60 ml. of mineral oil. Six weeks after sensitization the animals were each injected intradermally in 100 places with 0·2 ml. of johnin. All areas of skin showed a uniform and satisfactory sensitivity and the animals remained in good condition after a series of such multiple tests, with the exception of those in poor condition when sensitized. By utilizing the multiple injection method, it was shown that a double intradermal injection gave no advantage over a single injection, using a 0·2 ml. dose.

Sensitized animals injected in five different areas with serial dilutions of johnin gave satisfactory uniformity of reaction in the same dilutions both on the same animal and on different animals. A difference of less than 90% in the concentration of johnin was not detectable in a single series of dilutions, skin readings being taken to the nearest mm., but when four serial injections were made on each of five sensitized animals, a drop of 75% or more in potency could be readily detected. Potency relationships between johnins on five homologously and five heterologously sensitized cattle were satisfactorily determined by employing serial 10-fold dilutions intradermally.

The advantages of the multiple injection method in testing batches of johnin for potency are that they are tested on the animal species in which they are to be used as diagnostic agents, that the method is economical of animals and that sensitized cattle may be retested at intervals of one month.

IV. The gauge described eliminates the personal error which may be introduced by different operators. The essential improvements on the usual compass-type calipers are the incorporation of a uniform pressure spring, ensuring identical, duplicate readings, an accuracy of ± 0·25 mm., obtained by means of a vernier thimble and the flat faces and large diameters of the gauging discs, which are especially suited to measurements of round and oblong skin swellings.

V. A modified solid Dorset and Henley medium containing 100 g. per litre of fat-free, ground,-calf lymph node, supported rapid and marked growth of *Mycobact. johnei,* was simple in preparation and held moisture 6–10 months in the incubator at 38°C. Transfers to liquid media were made 4–6 weeks after inoculation of this lymph-node agar.

Six modifications of Dorset and Henley's synthetic medium were found to be satisfactory initiators of growth for inoculation into the synthetic medium used for johnin production. The first three modifications consisted of the incorporation of 100 g. of *Mycobact. phlei* extract, alone and plus 0·2% of vitamin K, and of 10 g. yeast extract instead of the *Mycobact. phlei* extract, and

the other three consisted of the substitution for 0·9 g. sodium citrate of 0·9 g. sodium succinate, ammonium urate, or ammonium citrate. These media were adjusted to pH 6·5–6·6 and autoclaved at 12 lb. pressure for 25 min. Different strains of *Mycobact. johnei* were found to exhibit a preference for one or more of the above media, and poor growth at this stage meant progressive diminution of growth when subinoculated on to the medium for johnin production. "Seed cultures", transferred several times on a suitable modified liquid medium, would withstand up to three transfers on Dorset and Henley's liquid synthetic medium.

Dorset and Henley's liquid synthetic medium was used for the growth of *Mycobact. johnei* for johnin production, the flasks being inoculated from seed cultures grown for 3–8 weeks. Two weeks after inoculation, and at weekly intervals thereafter, the pH, the dry weight of the organisms, the volume of protein precipitated by trichloracetic acid, and the potency for cattle and chickens of the johnin produced were determined.

The technique for johnin preparation was that described by Dorset and Henley for preparing heat-concentrated tuberculin. The pH of the medium became acid during early growth and alkaline as growth progressed. The bacterial dry weight and volume of protein precipitated by trichloracetic acid gave some relative estimate of johnin potency, but were not directly proportional to potency. A growth possessing a short lag phase and a logarithmic phase producing maximum growth at the end of 5–6 weeks was found to give a johnin of maximum potency.—A. B. PATERSON.

STOKES, J., Jr. (1944.) **The use of immune bodies in the treatment of certain infectious diseases (virus and rickettsial diseases) caused by intracellular parasites. With emphasis on the need for early diagnostic criteria of infection.**—*Yale J. Biol. Med.* **16.** 415–424. **71**

A review of favourable results following the administration of γ-globulin fraction II of pooled adult plasma in cases of measles in children, of convalescent serum in cases of influenza in man, mice and ferrets, of γ-globulin fraction of immune serum in cases of poliomyelitis in mice, and of immune serum in cases of Rocky Mountain spotted fever in man and guinea-pigs, leads S. to suggest that the use of antibody preparations in the therapeutic control of certain infectious diseases should receive increasing attention. In this connexion the importance of early diagnosis and the need for early diagnostic criteria are stressed.

S. suggests that the term prophylaxis be limited to the use of immune bodies prior to exposure of the individual to infection and that their use after exposure and during incubation should be termed treatment even if the infective agent cannot be demonstrated at the time of administration.—W. M. HENDERSON.

DEMIDOV, N. G. (1941.) Dinamika obrazovaniya antitoksina v syvorotke loshadeĭ, immunivirovannykh razlichnymi metodami stolbnyachnym anatoksinom. **[The mechanism of antitoxin formation in serum of horses immunized by various methods with tetanus toxoid.]**—*Trud. XV Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [*Diseases of Horses.*] pp. 82–90. **72**

Comparative immunization trials with untreated, precipitated, and aluminium hydroxide-adsorbed toxoids were made on 12 groups, each containing five horses.

A single vaccination with 1% $Al(OH)_3$-adsorbed toxoid was found to be the most effective. Sufficient antitoxin (0·01–0·02 unit) to protect against the test dose was present in the serum 15 days after vaccination; the antitoxin titre then rapidly increased to 0·5 unit, at which level it remained for 395 days. This toxoid retained its immunizing properties during storage for just over three years.

Precipitated toxoid was slightly less effective than adsorbed toxoid.

Single and double immunizations with untreated toxoid were the least effective; antitoxin was not demonstrable in the serum until 30 days after inoculation and it did not reach the 0·1 unit level for 90 days. Double immunization appears to have no advantages.

White mice were suitable for testing low concentrations (0·003 unit) of antitoxin.—A. MOLDAWSKY.

BIER, O. G., LEYTON, G., MAYER, M. M., & HEIDELBERGER, M. (1945.) **A comparison of human and guinea pig complements and their component fractions.**—*J. exp. Med.* **81.** 449–468. [Authors' summary copied *verbatim.*] **73**

Defects in methods previously proposed for the estimation of complement components are: failure to ensure an excess of the desired components and failure to ensure absence of anticomplementary effects in the dilution ranges used. Existing data are therefore subject to these uncertainties. Methods are proposed for controlling the adequacy of the reagent for each component, for using it in dilutions below its anticomplementary range, and for reinforcing it with necessary components if these are present in inadequate amounts. Titrations are given of the four components in human and guinea pig complements and in "mid-piece," "endpiece," and in the various reagents used, including one with C3 reactivity, solely, and one with C4 reactivity.

C3 is shown to be the component which usually limits the titer in guinea pig complement, and C2 the component of lowest titer in human complement. In immune hemolysis, each component of human complement may be replaced by the corresponding component of guinea pig complement and *vice versa.*

LÜHRS, E. (1943.) Ueber die Komplementwirkung. **[The action of complement.]**—*Z. InfektKr. Haustiere.* **59.** 158–162. **74**

The haemolytic activities of the albumin and globulin fractions of complement-containing serum were studied. The two protein fractions separately possessed very little, if any, lytic effect. Treatment of sensitized red blood cells with either fraction rendered them susceptible to attack by the other fraction. When sensitized r.b.c.s were treated with the protein fraction of complement-containing serum, no destruction of complement was observed. Destruction of complement only proved possible by the union of antigen and amboceptor on both protein fractions of the complement serum.

MARTIN, D. S., ERICKSON, J. O., PUTNAM, F. W., & NEURATH, H. (1943.) **Native and regenerated bovine albumin. II. Immunological properties.**—*J. gen. Physiol.* **26.** 533–539. [Authors' summary copied *verbatim.*] **75**

The effects of regeneration of whole bovine albumin on antigenic activity and serological specificity were determined by precipitin measurements on rabbit antisera to (1) native whole albumin, (2) albumin regenerated from 8M urea, and (3) albumin regenerated from 8M guanidine hydrochloride.

While numerically the mean antibody response to these three antigens was found to decrease in the order named, only the difference in antigenic activity between native and guanidine hydrochloride-regenerated albumin was statistically significant. Native, crystalline, carbohydrate-free albumin (crystalbumin) was considerably

less antigenic than native whole albumin, its activity being comparable to, if not less than, that observed for guanidine hydrochloride-regenerated whole albumin. All four antigens were immunologically equivalent. The antigenic activity of these proteins is discussed in terms of protein structure and carbohydrate content.

OLIVER-GONZÁLEZ, J., & TORREGROSA, M. V. (1944.) **A substance in animal parasites related to the human isoagglutinogens.**—*J. infect. Dis.* **74.** 173–177. **76**

The polysaccharide, protein-free fractions isolated from *Ascaris lumbricoides*, *A. lumbricoides* var. *suum*, *Necator americanus*, *Trichinella spiralis*, *Schistosoma mansoni*, and *Cysticercus cellulosae* were found in each case to inhibit the agglutination of human erythrocytes by the homologous agglutinin and to inhibit the haemolysis of sheep erythrocytes by the Forssman haemolysin of rabbit serum. Glycogen exhibited no such inhibition.

The authors further found a very high titre of α-agglutinins in the serum of patients of blood groups O and B undergoing repeated attacks of malaria. They suggest that this rise of agglutinin content, associated with hyperimmunization, may be brought about by antigens in the malarial parasite, and that the antibodies so produced may be responsible for the intravascular agglutination and haemolysis occurring in blackwater fever.—J. F. A. SPRENT.

See also absts. **8**, **10** (tuberculin test), **14** (c.-f. test in TB.), **26**, **27** (immunity in bovine trichomoniasis), **43** (virus immunity), **44** (haemagglutinins in viruses), **46** (F. & M. disease antiserum from horses), **52** (E.E. diagnostic tests), **102** (antibody treatment of lymphosarcoma).

PARASITES IN RELATION TO DISEASE [GENERAL]

BENBROOK, E. A. (1944.) **Parasites of sheep.**—*Iowa Vet.* **15.** No. 4. 5–7. **77**

A superficial summary of control measures against sheep nematodes, tapeworms, coccidia, screwworms and scab.—G. B. S. HEATH.

GASSNER, F. X. (1944.) **Parasitism and its effects on fur animals.**—*Amer. Fur Breed.* **16.** No. 10. 18, 20 & 22–23; **17.** No. 1. 20 & 22; and No. 2. 32, 34, 36 & 38. **78**

G. gives a useful popular account of parasitism in fur-bearing animals, with special reference to the conditions obtaining in the U.S.A. He begins by discussing the influence of climate, nature of the soil, degree of sanitation and other external factors on the incidence of parasitism and then goes on to deal with a number of parasitic conditions in more detail. He deals with myiasis caused by *Sarcophaga*, *Calliphora*, *Lucilia*, *Chrysomyia*, *Cuterebra*, and *Wohlfahrtia*, describing the treatment of affected animals as well as measures which may be taken to prevent the condition. Other arthropod parasites dealt with are fleas and ear mites. The diseases caused by hookworms, ascarids, lungworms, tapeworms, and bladderworms [cysticerci] are described, the symptoms, treatment and brief notes on the life-history being given in each case. Coccidiosis is treated at some length, whilst the final section refers to diagnosis of helminthiasis by means of examination of the faeces for eggs.—T. E. GIBSON.

See also abst. **207** (laboratory manual of parasitology).

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

TURNER, R. G. (1945.) **Human creeping myiasis. Report of a case.**—*Brit. med. J.* July 7th. 11–12. **79**

A case history is given of *Hypoderma bovis* infestation in a human being. The case was characterized by swellings, the first of which appeared in July 1943 and the last during February 1944, and from five of which larvae of *H. bovis* were removed. It appears likely that infection was acquired in the summer of 1943, the eggs hatching and the larvae penetrating the skin painlessly. It is not certain whether the larvae migrated in the patient or whether they emerged where oviposition had occurred. Their widespread distribution, the sensation of "creeping" noted by the patient and the apparent surfacing and sinking of the larvae in the skin suggest that migration did take place.—T. E. GIBSON.

SAPRE, S. N. (1944.) **The systematic position of *Ornithodorus crossi* Brumpt (1921).**—*Indian J. vet. Sci.* **14.** 54–55. **80**

BRUMPT (1921) described *O. crossi* from India, but later agreed with PAVLOVSKY (1930), who had examined only Russian forms of this tick, that it was synonymous with *O. papillipes* Birula (1895).

Since marked differences exist between the Indian and Russian forms in the disposition of the hypostomal teeth and in the size of the anus, vulva and basis capituli, S. maintains that *O. crossi* is a valid species and not a synonym of *O. papillipes*. The Indian form is described in detail.—M. A. KHAN.

See also absts. **4** (horn fly), **53** (vectors of E.E.), **99** (of bovine ocular thelaziasis), **147**, **165–176** (insecticides).

PARASITES IN RELATION TO DISEASE [HELMINTHS]

THAPAR, G. S. (1944.) **Role of domestic animals in the spread of helminthic infections in man.**—*Curr. Sci.* **13.** 274–276. **81**

A general article with references to cases reported from India. The need is emphasized for close co-operation of workers in medicine, veterinary science, agriculture and zoology in combating helminth parasites in man and domestic animals.—H. D. SRIVASTAVA.

MUDALIAR, S. V. (1943.) ***Cotugnia bhaleraoi* n. sp.**—*Indian J. vet. Sci.* **13.** 166–167. **82**

This new species is described from *Gallus gallus domesticus* from Madras, and is differentiated from the allied species, *C. margaretta* Beddaw, 1916.—M. AMIN.

KRAKOWER, C., HOFFMAN, W. A., & AXTMAYER, J. H. (1944.) **Defective granular eggshell formation by *Schistosoma mansoni* in experimentally infected guinea pigs on a vitamin C deficient diet.**—*J. infect. Dis.* **74.** 178–183. **83**

In a batch of g. pigs artificially infected with *S. mansoni* and fed upon a diet deficient in vitamin C, supplemented by 3 mg. of ascorbic acid per week, formation of the eggshell of the parasite was found to be deficient, resulting in disintegration of the shell into granular particles, resembling those of the vitellaria of the parasite. Such deformity did not occur in g. pigs receiving grass or larger doses of ascorbic acid. The disintegrated eggshells began to appear about a week after commencement of the diet and by the 27th day, 50% of the eggs were abnormal. It was shown that such disintegration was not due to altered influence of the host, consequent upon the lack of vitamin C, but

was already advanced in the uterus of the parasite. It is suggested that vitamin C is necessary for the formation of some binding substance which in normal eggs cements the vitellogenous granules into a homogeneous membrane, thus constituting the eggshell.—J. F. A. S.

SCHÖNBERG. (1943.) Zum Vorkommen von Cysticercus inermis in der Schlundmuskulatur des Rindes. [*Cysticercus inermis* (= *C. bovis*) **in the oesophagus of cattle.**]—*Z. Fleisch- u. Milchhyg.* **53.** 237–238. **84**

Since the description by FUNCK (1930) of *C. bovis* in the oesophagus of cattle, reports of subsequent cases have demonstrated the necessity for the examination of the oesophagus of all slaughtered beasts for these cysts. It is stressed that both the inside and the outside of the oesophageal wall should be carefully examined, superficial examination being often insufficient for the detection of the cysts.—T. E. GIBSON.

*TENHAEFF, C., & FERWERDA, S. (1943.) [**Twenty-five years of** *Echinococcus* **control in Friesland, Holland.**]—*Geneesk. Bl.* **40.** 81. [Abst. from abst. in *Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **52/50.** 34.] **85**

Following the publication by SNAFFER in 1907 of a report on the heavy incidence of hydatid disease in man in the three northern provinces of the Netherlands, an official enquiry was made. Eighty-three dogs, including 23 sledge dogs, were examined in different villages and 10 animals, eight of them sledge dogs, were found to be carrying *Echinococcus granulosus*. Keepers of such dogs were forbidden to feed them on uncooked meat, and in 1919 meat-inspection regulations were brought into force. Since then the incidence of *Echinococcus* infestation in slaughtered sheep has decreased from 24% down to 0·127% in 1941. In young pigs a similar decrease in incidence from 2% to 0·2% was observed. Human hydatid disease showed a parallel decrease, there being 27 cases in 1921–23, but only nine in 1930–32.—T. E. GIBSON.

*VOLAVSEK, E. (1943.) Ein Fall von primärem Netzechinokokkus. [**Primary** *Echinococcus* **cyst in the omentum.**]—*Med. Welt.* p. 369. [Abst. from abst. in *Z. Fleisch- u. Milchhyg.* **53.** 197.] **86**

Echinococcus cysts may be found in all organs of the body, but primary echinococcosis of the peritoneum is rarely seen in man. The author describes a case where tumours the size of the fist, occurring in the right side of the abdomen, proved after surgical removal to be hydatid cysts.—T. E. GIBSON.

URBAIN, A., & NOUVEL, J. (1944.) Petite enzootie de strongyloïdose observée sur des singes supérieurs : Gibbons à favoris blancs (*Hylobates concolor leucogenis* Ogilby) et chimpanzés (*Pan troglodydes* (L.)). [**Enzootic of** *Strongyloides stercoralis* **infestation among higher apes in the Muséum National d'Histoire Naturelle, France.**]—*Bull. Acad. vét. Fr.* **17.** 337–341. **87**

A description is given of the outbreak. The disease was originally brought into the zoological gardens by two chimpanzees imported from French Guinea, which died following an illness characterized by enteritis, emaciation, anaemia, and inappetence. Six months later a gibbon died after having fits of abdominal pain, and at P.M. examination large numbers of *S. stercoralis* were found in the intestinal contents. Following this second fatality, the faeces were examined of all animals which had been in direct or indirect contact with the chimpanzees. Three of four chimpanzees were found to be passing *Strongyloides* eggs in the faeces and one showed signs of anaemia. The affected animals were treated with gentian violet, the dose being 25 mg. Eight days later the two animals least affected had ceased to pass eggs in the faeces. The third animal, in spite of two further treatments at weekly intervals of 30 mg. and 50 mg. respectively, continued to pass eggs in the faeces. The presence of these infestations in gibbons and chimpanzees suggests that these animals may serve as reservoirs of infection for man in tropical regions.—T. G. GIBSON.

WEHR, E. E., & ALLEN, R. W. (1945.) **Additional studies on the life cycle of** *Capillaria caudinflata*, **a nematode parasite of chickens and turkeys.**—*Proc. helminth. Soc. Wash.* **12.** 12–14. **88**

Eggs of *C. caudinflata* teased from gravid females were incubated in shallow water at room temperature until embryonation was complete. After a small number of the eggs had been tested for hatchability, the rest were fed to earthworms of the species *Allolobophora* (*Helodrilus*) *caliginosa* and *Eisenia* (*H.*) *foetida* by introducing them into the gut by means of a capillary pipette. 27–31 days later dissection of the earthworms showed larvae to be present in their tissues. A description is given of the larva of *C. caudinflata* and it is also noted that the larva can be distinguished from that of *C. annulata* on the basis of size, motility, and the presence of a deep constriction between the tail and the rest of the body in *C. caudinflata*.—T. E. GIBSON.

KERR, K. B. (1942.) **Trichinosis problem in California. Report of a survey 1940–1941.** pp. 37. Sacramento, Calif. : State of California Department of Public Health in cooperation with the U.S. Public Health Service. **89**

This is an account of a survey of the incidence of trichinosis in pigs reared in California. Diaphragm samples were examined in the abattoirs and infected pigs were traced back to the farms on which they had been reared. A total of 7,034 pigs from 897 farms was dealt with.

The frequency of infection was 12 times as high in pigs which had been fed on garbage as in those fed on grain. Infected pigs were found on 59 of the 897 farms. On 43 of these the pigs had been given uncooked garbage. No infected swine were found on seven farms at which the garbage had been cooked before feeding. Infected pigs were found on two out of 20 farms where cooked offal from abattoirs had been fed. Investigation indicated that the cooking of the offal had not been properly supervised. Infected pigs were found on seven out of 419 farms where the pigs had been grain-fed. Infection in these cases was probably from small quantities of kitchen scraps fed from time to time. No infection was found in 101 rodents, including field mice, ground squirrels and gophers, collected on these seven farms. 154 rats were collected from infected farms where the pigs had been fed on uncooked garbage. Nine (5·4%) of the rats were infected, an incidence which approximated the incidence in pigs on the same farms. The possibility of the pigs having acquired infection by eating rats or other small rodents is considered to be rather remote.

2,359 specimens were examined of various types of pork products as sold on the retail market. No infection was found in 609 samples of products which had been processed to kill trichinae. Of the 1,750 specimens from products which had not been processed, 22 were found infected, 21 of these being samples of fresh sausage.

Seventy specimens of human diaphragm were also examined, and 7·1% were found to be infected. The distribution of human cases showed a striking parallelism with the incidence in pig carcasses and in market pork.

K. concludes that the most practicable measure of control of human trichinosis is the cooking of all

garbage fed to swine and he advocates legislation to make this compulsory. England and Canada are cited as countries where such legislation is enforced, with a consequent low incidence of human trichinosis.—M. C.

WRIGHT, W. H., & BRADY, F. J. (1940.) **The medical and public health aspects of trichinosis.** pp. 14. Washington, D.C.: National Institute of Health. 4to. Mimeographed. **90**

This is a résumé of the trichinosis problem containing little new information and dealing with the life-history of the parasite, incidence of infection, symptomatology, diagnosis, and treatment from the human standpoint. It is emphasized that pigs fed on uncooked garbage are the chief source of human trichinosis and that, of the preventive measures against the disease, the control of garbage feeding appears to be the most feasible of the various methods at the present time.

—J. N. OLDHAM.

DESMOND, T. C. (1943.) **The trichinosis problem: legal aspects.**—*Merck Rep.* **52.** No. 1. 12–15. **91**

D., who is Chairman of the New York State Trichinosis Commission, outlines the pattern of legislation designed to prevent the spread of trichinosis in the U.S.A. He discusses briefly the regulations requiring garbage to be boiled for half-an-hour, or garbage shipped in interstate traffic for feeding purposes to be heated to 212°F. for 30 min., and the laws forbidding the feeding to pigs of uncooked offal from abattoirs and requiring special processing to destroy the parasites of any articles of food containing pork customarily eaten without cooking. There is also legislation which bans the mixing of pork in hamburgers, normally eaten undercooked. Abattoirs are required to be licensed and to be maintained in a sanitary condition; failure to keep the premises and equipment clean may result in revocation of licence. D. mentions that state departments of health have been urged to launch a broad educational campaign to help to combat trichinosis.—J. N. OLDHAM.

HIN, A. K. N. C. (1945.) **A sporadic case of trichiniasis.**—*Brit. med. J.* Aug. 18th. 219. **92**

A sporadic case of human trichinosis is reported from the Torbay hospital. The patient was an evacuee from London. An intradermal test with trichina antigen was negative on the 16th day of illness, but when the test was repeated on the 43rd day a positive reaction was obtained.

The source of infection was not determined. The patient was accustomed to eat sausages twice a week, taking them uncooked and spread on bread. Her husband and three children ate them cooked in the usual way. The sausages were obtained from a small store which was supplied by a large firm. It was not possible to incriminate any of the firm's pork or any particular batch of sausages. [It is not stated whether the sausages were made from imported or home-bred pork.]—M. C.

PUKHOV, V. I. (1941.) Izuchenie metodov radikal'noĭ profilaktiki pri strongileze loshadeĭ tabunnovo soderzhaniya. **[Studies of methods of radical prophylaxis of equine strongylosis in horses kept in droves.]**—*Trud. XV Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [*Diseases of Horses.*] pp. 173–180. **93**

P. examined for two years the incidence of worm infestation in a stud where the horses were kept in droves for most of the year. Systematic examination of the faeces and cultivation of larvae under field conditions were also carried out. Of adult horses and older colts, 80–100% were infested with *Strongylus vulgaris* and *S. edentatus*, and 100% with *Trichonema*. *Parascaris equorum* was met with in adult horses only occasionally, whereas 50–75% of foals were infested. Sucking foals had no strongyle eggs in the faeces, which is accounted for by the interval required for these parasites to reach maturity; the development of *S. vulgaris* from the infective larva to the adult in an experimentally infected foal, was found to take seven months. *S. equinus* was not found. The high rate of infestation is believed to be due to unsystematic use of the pastures, unhygienic water supplies, incorrect disposal of manure, and haphazard anthelmintic treatment in previous years.

P. found that from November to the middle of April, with outside temperatures between −5° and +5°C., eggs and first- and second-stage larvae of strongyles and *Trichonema* perish; 80–85% of infective larvae succumb. At temperatures of 7°–38°C. larvae survive and develop. Temperatures below 7°C. cause anabiosis, and above 38°C. degeneration occurs. The development of larvae to the infective stage takes 6–15 days. A moisture content of the faeces below 15–20% inhibits development. In faeces containing 8–12% moisture, 15–20% of infective larvae survive for one year, whereas the eggs perish within a few days and first- and second-stage larvae within 30–45 days. In thin layers of faeces, 85–90% of infective larvae perish within 65–75 days. The migration of first- and second-stage larvae from faeces on the grass is less pronounced than that of infective larvae which migrate during rain or dew. From these observations, P. considers that strongylosis and trichonemiasis increase from May to October and decrease from October to May.

P. recommends two schemes for the systematic use of pastures in order to inhibit the development of these helminths. The first consists of the division of the pasture area into 22 sections, each of which should be used during May, September and October for ten days and during June, July and August for six days. The second scheme consists in the division of the area into 12 sections, each to be used for the same length of time twice during the pasturing period. Under this scheme faeces should be removed or scattered in thin layers to prevent the larvae from reaching the infective stage.

P. claims that after one year of such prophylactic measures, the incidence of helminths dropped from 72·1% in a control group to 21·2% in animals kept on the experimental pastures.—A. MOLDAWSKY.

SHUMAKOVICH, E. E. (1940.) K voprosu o deĭstvii vodnykh rastvorov khlorpikrina na yaĭtsa i lichinki strongilid. **[Effect of aqueous solutions of chloropicrin on the eggs and larvae of *Strongylus*.]**—*Veterinariya, Moscow.* No. 4. pp. 105–108. [French summary.] **94**

In vitro and field tests with aqueous chloropicrin solutions on *Strongylus* eggs and larvae (mainly *S. edentatus*), showed that the expected toxicity to the parasites was not obtained, due to the excessive volatility of chloropicrin in aqueous solution. If evaporation was reduced, *e.g.*, by corking the test tubes in *in vitro* tests, then a 1 : 1,000 solution was fatal to the eggs and larvae in a few minutes. If horse faeces treated with such a solution were dug into the ground and covered with soil, almost 100% mortality of larvae was obtained; whereas if such faeces were only sprinkled over the ground and covered with a layer of soil to a depth of 2–3 cm., only 80–85% of the larvae were killed.—L. L.

DELAUNE, E. T., & MAYHEW, B. R. (1943.) **Studies on bovine gastro-intestinal parasites. VI. The blood picture in stomach worm (Haemonchus contortus) infections.**—*Trans. Amer. micr. Soc.* **62.** 179–193. [For previous parts, see *V. B.* **12.** 39; for part VII, see *V. B.* **15.** 191; for parts VIII and IX, see *V. B.* **15.** 328.] **95**

Nine calves were used in this experiment, six being

infected artificially with *H. contortus* and three serving as controls. The erythrocyte count decreased, beginning 5–7 days after inoculation, from approximately 10 millions to 2½ millions per cu. mm. at the end of the prepatent period. The haemoglobin content showed a similar trend, decreasing from 8·7 g. to 1·45 g. per 100 ml. The leucocyte counts increased for 8–14 days, beginning 5–7 days after inoculation, but fell as low as 1,750 per cu. mm. at the end of the prepatent period. After the prepatent period the erythrocyte and leucocyte counts and the haemoglobin content increased to pre-inoculation level. Differential leucocyte counts showed a decrease in lymphocytes and an increase in monocytes. Eosinophiles did not increase higher than 7·5%. The changes observed during the prepatent period indicate that injury to the host occurs during the larval period as well as during the adult life of the parasites.—T. E. G.

EVELETH, D. F., & GOLDSBY, A. I. (1945.) **The gastro-intestinal parasites of sheep in North Dakota.**—*Vet. Med.* **40.** 90–96. **96**

A survey is given of the gastro-intestinal parasites of sheep in North Dakota. By a series of selected case records, the authors show the poor results which may follow the accepted methods of anthelmintic treatment. An alkaline anthelmintic mixture which they recommend is alleged to act by dissolving gastric and duodenal mucus, thus allowing the anthelmintic to come in direct contact with the parasite.—G. B. S. HEATH.

ANTIPIN, D. N. (1940.) Epizootologiya paraskaridoza loshadei. [**Epizoology of *Parascaris* in horses.**]—*Veterinariya, Moscow.* No. 3. pp. 46–64. [French summary.] **97**

A. has established that *Parascaris* ova become infective only after the larvae have exsheathed. This stage is reached in a minimum of 12 days at 23°–31°C. outside temperature, or in seven days under laboratory conditions at 28°–30°C.

In Moscow and Ryazan regions, the ova are dormant from the second half of October (shade temperature 3°–12°C., and up to 26°C. in the sun), and 87% remain viable for over a year.

Ascariasis was found to affect principally foals aged 3 months to 1½ years. The incidence in animals aged less than 1 year was 66·1%, in those aged 1–2 years 47·1%, 2–3 years 27·1%, and in fully grown horses 22·9%. The earliest age at which parasites were found was 2 months 17 days. The parasite has a seasonal cycle, the period of maximum infection being December-February, the minimum June-August. Infection usually takes place in stables and paddocks and at pasture; infection by water is on a very small scale.

Not less than three faecal examinations are necessary to reveal the presence of slight *Parascaris* infestation.—E. CHERKESI.

HILL, G. R., & SMYTH, J. D. (1944.) **Localization of vitamin C in *Belascaris marginata* [= *Toxocara canis*].**—*Nature, Lond.* **153.** 21–22. **98**

By using the silver nitrate and acetic acid staining technique the authors found that a large aggregation of vitamin C could be demonstrated in the walls of the intestine of specimens of *T. canis* taken from dogs fed on a normal mixed diet. Compared with the intestinal cells the muscle cells and reproductive organs contained only very small amounts of vitamin C. It appears, therefore, that the parasite can absorb considerable quantities of the vitamin from the food of the host and it is suggested that, in heavy infestations, absorption of vitamin C by the parasites might be sufficient to cause deficiency effects in the host.—R. ALLCROFT.

PETROV, A. M., GAIBOV, A. D., & GAGARIN, V. G. (1940.) Izuchenie epizootologii i profilaktiki pri telyazioze glaz krupnovo rogatovo skota. [**Ocular thelaziasis in cattle.**]—*Veterinariya, Moscow.* No. 5. pp. 75–87. [French summary.] **99**

The life-history and morphology of *Thelazia rhodesi*, the causal agent of bovine ocular thelaziasis in Azerbaijan, are described in some detail. It is shown that sexual maturity of the parasite is reached in late August, that cross-infection occurs in spring and summer, that the parasite lives on its host for 9–10 months and that permanently stabled cattle do not become infected.

Neither the mode of infection nor the intermediate host(s) could be ascertained. Neither *Musca domestica* adults and larvae, nor *Stomoxys calcitrans* was found to be responsible for transmission. Cattle were the only satisfactory final hosts.

The best control measure consisted in syringing out the parasites from under the conjunctiva with 3% boric acid solution, once a month from July to September inclusive.—L. LEVENBOOK.

SCHNELLE, G. B., & YOUNG, R. M. (1944.) **Clinical studies on microfilarial periodicity in war dogs.**—*Bull. U.S. Army med. Dep.* No. 80. pp. 52–59. **100**

Some disagreement exists regarding the periodicity of microfilariae in the peripheral circulation. In dogs affected with heartworm, *Dirofilaria immitis*, the authors found that a peak occurred during the late afternoon. The spleen appears to be a reservoir of the parasites and intravenous administration of adrenalin or occlusion of the splenic artery caused a rapid rise in the number of microfilariae in the peripheral circulation. The period between exposure to infection and appearance of parasites in the peripheral blood vessels averaged more than eight months. An improved method of diagnosis is described.—G. B. S. HEATH.

See also absts. **76** (agglutinogen action of helminth fractions), **177, 178** (anthelmintics), **191, 192, 205** (trichinosis).

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

*BARILE, C. (1942.) Contributo allo studio dei tumori intestinali nei bovini ed ovini. Concomitanza di invaginazione e di dilatazione intestinale. [**Neoplasms in the intestines of cattle and sheep.**]—*Profilassi.* **15.** 54–65. [Abst. from abst. in *Jber. Vet.-Med.* **70.** 537.] **101**

This is a description of three cases. The first was a cow sent for emergency slaughter because of intussusception caused by a cystic papillary fibro-adenoma arising from several parts of the mucosa of the ileum. The second was a pedunculated fibrolipoma of the small intestine in a cow sent for emergency slaughter because of dilatation of the jejunum caused by the tumour. The third case was a leiomyosarcoma of the jejunum in a sheep with metastases in the mesenteric lymph nodes.—E. G. WHITE.

NETTLESHIP, A. (1945.) **Regression produced in the Murphy lymphosarcoma by the injection of heterologous antibodies.**—*Amer. J. Path.* **21.** 527–541. **102**

By using a lymphosarcoma antiserum obtained from rabbits, N. produced a retardation in the growth of the Murphy lymphosarcoma in rats and a significant reduction in the mortality rate.

Fresh frozen lymphosarcoma was divided by chemical means into four fractions. It was found that fraction I, containing nucleoprotein and denatured proteins was the most effective antigen. In order to produce antibody of high titre, it had to be injected into rabbits in large and frequent doses over a prolonged period. The serum obtained from these rabbits often caused regression or necrosis on injection by the subcutaneous route into tumour-bearing rats. Microscopical examination of the tumours so treated showed destruction of lymphosarcoma cells and massive fibrosis similar to the picture seen in spontaneously regressing tumours.—JOHN G. CAMPBELL.

CAMERON, A. T., MELTZER, S., & LEDERMAN, J. M. (1945.) **A study of the effect of certain dietary factors on the production of tar-carcinoma in mice.**—*Canad. J. Res.* Sect. E. **23.** 50–69. **103**

The literature reviewed suggests a relationship between diet and the experimental production of skin carcinoma in mice.

With the amounts of dietary proteins tested no evidence was obtained that protein is a dietary factor affecting the time of onset of skin carcinoma. Likewise, essential unsaturated fatty acids were not a factor, but too few animals were employed to permit final judgment on this point. The carcinogenic agent employed was of much greater importance than any dietary factor or any pre-treatment of mice or their progenitors in determining the incidence of skin carcinoma.

A slight modification of the Mackenzie-McCollum diet for rats (cane sugar and casein, with the necessary vitamins, minerals, etc. added) proved only moderately successful as a diet for the experimental mice; their life span was shortened and maintainance of body weight less perfect. The Waddell-Steinback diet for rats (ether-extracted casein, dried whole milk and various meals, with vitamins, minerals, hydrogenated oil and essential unsaturated fatty acids) proved a suitable vehicle for testing protein modification of the diet. However, although it permitted mice to live to a considerable age it did not appear to be satisfactory for breeding.

—P. J. G. PLUMMER.

BLAKEMORE, F. (1945.) **Further observations on the demonstration of an infective agent in the tissues of fowls affected with fowl paralysis (neurolymphomatosis).**—*J. comp. Path.* **55.** 1–18. **104**

B. presents an account of further studies upon the virus obtained from fowls affected with fowl paralysis [see also *V. B.* **10.** 40 and **11.** 707].

Strains of virus similar to that described previously were demonstrated in 12 of the 14 outbreaks investigated. The ease with which the virus could be demonstrated from different outbreaks varied and serial passage of tissues through young chicks and microscopic examination were sometimes necessary. The virus was shown to be transmissible by various parenteral routes and also by pen contact. An indication was obtained that stocks of chicks varied in their susceptibility to the virus.

Twenty-three of a total of 33 chickens inoculated at 8–20 weeks old developed neural lesions; none of the nine fowls inoculated at 1½–2 years of age developed neural lymphomatosis. Resistance which could not be attributed to previous infection appeared to develop slowly with age; the tendency for lymphomatosis lesions to develop was apparently associated with partial immunity of the tissues.

The gross and microscopic appearance of the lesions of the prelymphomatosis reaction and the transition to the chronic (lymphomatosis) condition is outlined. It seemed probable that the lesions in the peripheral nerves were due to a stimulation of the vessels and interfibrillary structures followed by a lymphocytic infiltration between the fibres.

A study of the average leucocyte counts of infected and healthy chicks indicated a transient increase of white cells to a maximum of 69,000 per cu. mm., the change being primarily due to an increase in the numbers of lymphocytes and monocytes.

The virus was found to pass Berkefeld V filters and gradocol membranes of 0·6μ porosity. No inclusion bodies could be demonstrated. The virus was shown to be destroyed after exposure to a temperature of 56°C. for 30 min. and to be adsorbed upon fowl and equine erythrocytes. An attempt to demonstrate neutralizing antibodies to the virus in the serum of a paralysed fowl did not yield a definite result.—F. D. ASPLIN.

See also abst. **205** (lymphomatosis).

DISEASES, GENERAL

KAPUR, H. R. (1945.) **Contagious (?) keratitis in goats.**—*Indian vet. J.* **21.** 309–316. **105**

K. reports an outbreak of contagious keratitis in 100 goats from North Bihar (India) and describes the symptoms and lesions. Attempts to transmit the disease by direct contact, swab application, application of corneal scrapings, application of culture material and by blood inoculation gave negative results. Believing that this condition was due to a deficiency of vitamin A, K. treated two affected goats with haliverol but found that the eyes of an untreated goat cleared much earlier than those of goats receiving treatment.—H. N. RAY.

GORDON, R. F., & BLAXLAND, J. D. (1945.) **The occurrence in England of outbreaks of disease in poultry resembling the "so-called pullet disease" of America.**—*Vet. J.* **101.** 3–9. **106**

An account is given of a number of outbreaks of a condition apparently identical with "pullet disease" ("blue comb", X-disease etc.).

The birds primarily affected were pullets 6–8 months old, just about to lay. The symptoms reported were drop in egg production, loss of appetite and occasional diarrhoea. The birds were dull, with ruffled plumage and the head and facial appendages became cyanotic. The crop was markedly distended and full of sour-smelling pasty foodstuff.

Mortality was low, varying from 2–23% and usually the majority of the affected birds recovered, although they experienced a considerable set-back. The most typical lesion found P.M. appeared to be an acute urate nephritis often accompanied by visceral gout. The ovary, if active, showed soft, misshapen or ruptured yolk-sacs and the contents of these were frequently a dirty greenish colour. The carcass was generally congested and the crop and gizzard were distended with a mass of sour food.

The disease differed from the acute type reported in America. The necrotic liver lesions and "chalky" pancreas were not seen in these outbreaks, which were classed as sub-acute. No infective agent could be found, either by bacteriological examination or transmission experiments. A nutritional cause was suspected, probably a nephro-toxicosis of metabolic origin, but so far the condition has not been produced by feeding experiments.—JOHN G. CAMPBELL.

CONNER, G. H. (1945.) **Prognostic value of blood determinations in certain surgical conditions of the horse.**—*Amer. J. vet. Res.* **6.** 45–53. **107**

Erythrocyte and differential leucocyte counts with haemoglobin estimations were performed on a number of horses with various surgical conditions such as fistulous withers, quittor and strangles, control estimations being made with blood from normal horses.

The data were recorded on charts (modifications of Schilling's haemogram) employing the "shiftograph" technique (a graphic representation of the Schilling index).

It was found that prognoses could be given as a result of such examination, but only after a series of frequent blood counts had been made. Of most value for prognosis was the Schilling index taken in conjunction with the total leucocyte count. Definite trends were established for cases resolving favourably and unfavourably.—JOHN G. CAMPBELL.

SPIEGL, A. (1944.) Herzmuskelverkalkung bei Entenküken. **[Calcification of the heart muscle in ducklings.]**—*Berl. Münch tierärztl. Wschr./Wien. tierärztl. Mschr.* Jan. 21st. 35–36. **108**

Eleven cases are recorded of which all but two came from different farms. The affected birds sat with heads drawn in, their beaks were pale and the illness lasted 2–3 days. On P.M. examination the liver was found to be slightly swollen and there was an inflammatory reaction in the first part of the small intestine, but otherwise all abdominal organs were normal.

The heart was enlarged and the left ventricle appeared to be calcified on the external area of the myocardium. Histologically, normal muscle fibres were intermixed with bundles of fibres with enlarged nuclei. Treatment of the calcified area with hydrochloric acid produced effervescence.—A. T. PHILLIPSON.

*ROMBOLI, B. (1942.) Importanza delle alterazioni bronchiali nella patogenesi della "pneumatosi cistica dei gangli linfatici polmonari nei bovini". **[Importance of bronchial lesions in the pathogenesis of emphysema of the lymph nodes in cattle.]**—*Clin. vet., Milano.* **65.** 375–388. [Abst. from abst. in *Jber. Vet.-Med.* **71.** 98.] **109**

Emphysema of the lymph nodes is caused by dilatation of the lymph ducts and sinuses filled with air from the lungs but it is doubtful whether air reaches the lymph nodes by passing along the lymph vessels. In three cases of inflammation of the lungs, R. discovered degenerated and necrotic patches and even ruptures in the bronchioles in the region of the peribronchial lymph nodes. He considers that when coughing takes place, air enters the lymph nodes through these tears and causes emphysema of the lymph nodes.
—T. E. GIBSON.

*DI FULVIO, A. (1942.) Frattura e necrosi del corpo dell'osso joide in un mulo. **[Fracture and necrosis of the hyoid bone in a mule.]**—*Riv. milit. Med. vet., Roma.* **5.** 223–227. [Abst. from abst. in *Jber. Vet.-Med.* **71.** 103.] **110**

A seven-year-old mule, which displayed symptoms of cough, inappetence and regurgitation and had been treated for strangles, had a painful swelling in the throat region with an intermandibular fistula discharging pus. The case was diagnosed as one of fracture of the hyoid bone; the fistula was enlarged and two pieces of necrotic bone from the hyoid body were removed. The usual wound treatment was applied and healing took place in three weeks. Fracture was caused by a fall whilst the animal was working with a tight throat lash applied.—T. E. GIBSON.

KRUPSKI, A., UEHLINGER, E., & TSCHUMI, H. (1942.) Abnorme Stellung der Vordergliedmasse bei einer Kuh der Fleckviehrasse. XIII. Mitteilung. **[Abnormal limb postures in Swiss spotted cattle. XIII.]**—*Schweiz. Arch. Tierheilk.* **84.** 418–423. [For Part XII, see *V. B.* **12.** 229.] **111**

The authors describe, with the aid of photomicrographs, a case of arthritis deformans of the carpal joints in a 10-year-old cow.—E. G. WHITE.

JACQUET, J. (1944.) Deux cas de consolidation d'une rupture ancienne de l'utérus chez les bovidés. **[Two cases of consolidation of an old rupture of the uterus in cattle.]**—*Bull. Acad. vét. Fr.* **17.** 103–104. **112**

In two cows which died following abortion, P.M. examination showed the presence of old, healed rupture of the uterus. In each case, the edges of the rupture were greatly thickened; there were adhesions between the uterus and the mesentery and direct communication between the cavity of the uterus and the peritoneal cavity.—M. C.

See also absts. **200** (disease control in slaughter animals in India), **203** (animal disease research in the U.S.S.R.), **204** (animal diseases in West Africa), **205** (in the U.S.A.), **205** (hermaphroditism in goats).

NUTRITIONAL AND METABOLIC DISORDERS

GILLMAN, J., GILLMAN, T., MANDELSTAM, J., & GILBERT, C. (1945.) **The production of severe hepatic injury in rats by the prolonged feeding of maize-meal porridge (mealie-pap) and sour milk.**—*Brit. J. exp. Path.* **26.** 67–81. **113**

It has been shown, by means of liver biopsy, that extensive liver damage is present in acute cases of malnutrition in negroes in South Africa; repeated biopsies in a patient suffering from recurrent attacks of pellagra revealed that the liver became cirrhotic. These people are poor and live mainly on a diet high in carbohydrate, consisting chiefly of maize meal usually made up into a thick porridge known as "mealie pap", supplemented irregularly by beans, vegetables, and often by fermented cow's milk.

The authors have now shown that a diet of "mealie pap" and soured milk fed to young rats produces widespread lesions, including a peculiar form of liver damage which they describe in detail. After about 15 months, the livers underwent diffuse fatty changes, cirrhosis, lobar absorption, or diffuse lobar enlargement, one or more of these processes being present in the same liver. It was shown by biopsy that fat appeared in the liver after 14 days, increasing steadily up to 250 days; at this time, the liver was diffusely enlarged, almost all the liver cells showing a single large fat globule, the sinusoids being generally closed. Other changes then occurred, such as diffuse enlargement of whole lobes, absorption of whole lobes without necrosis, interstitial proliferation, or nodular cirrhosis.

An important finding was that cirrhosis was not a necessary consequence of liver damage; from a study of the changes present the authors concluded that the hepatic parenchyma and the interstitial tissue may react independently to dietary injury. Older rats were found resistant to the diet, growth appearing to be essential for the development of the liver damage. Young rats fed entirely on "mealie pap" did not develop the characteristic liver lesions, although they did not grow and eventually died; sour milk added to the diet stimulated growth and apparently created circumstances favourable to the development of the liver lesions.

A tentative conclusion was drawn that the liver lesions were not due to the presence or absence of any

specific factor or factors, but to the general imperfections of the diet, accentuated by the demands for growth. —E. COTCHIN.

HOLMAN, R. L. (1945.) **Cirrhosis of the liver in "donor" dogs fed a high fat diet and subjected to repeated bleedings.**—*J. exp. Med.* **81.** 399–404. **114**

Ten of 13 dogs subjected to repeated bleedings over a period of 1–3 years and fed for a year or more during that time on a diet relatively high in fat (beef bones with much adherent fat) developed liver cirrhosis, while two of the remaining three showed a marked hepatic fatty change. In all but one of these cases, the liver changes could be attributed to the combined effects of the diet and bleeding and appeared to be the same as those produced in normal dogs by a very high fat diet [see *V. B.* **13.** 295].

Neither the diet alone nor the repeated bleedings appeared to produce cirrhosis, and it seemed possible that the repeated bleedings increased the fatty changes in the liver due to the diet and resulting in cirrhosis, by leading to a more marked lipaemia, by producing anoxia, or by the removal of something other than haemoglobin, such as methyl groups, choline, vitamins or lipases. Further experiments are necessary to determine which of these factors is important.—E. COTCHIN.

MADDEN, S. C., WOODS, R. R., SHULL, F. W., & WHIPPLE, G. H. (1944.) **Amino acid mixtures effective parenterally for long continued plasma protein production. Casein digests compared.**—*J. exp. Med.* **79.** 607–624. **115**

Nitrogen losses following tissue injury from physical trauma, burns, infection and major surgical procedures may be so large that oral intakes are inadequate. The present work, carried out upon two dogs previously standardized by a process of body protein and plasma protein depletion, confirms the view based on earlier work that ten growth-essential amino acids plus glycine will maintain nitrogen balance and will produce as much new plasma protein as will good diet proteins. The amino acids were given over a period of several months, both orally and parenterally. Various mixtures of individual amino acids were tested, as also were two casein digests, but the latter were not considered to be as effective, one being less tolerable upon intravenous injection than certain mixtures of amino acids, whilst the other afforded bare nitrogen equilibrium and produced virtually no plasma protein. —H. V. HUGHES.

I. SMITH, S. E., & MEDLICOTT, M. (1944.) **The blood picture of iron and copper deficiency anemias in the rat.**—*Amer. J. Physiol.* **141.** 354–358. **116**

II. SMITH, S. E., MEDLICOTT, M., & ELLIS, G. H. (1944.) **The blood picture of iron and copper deficiency anemias in the rabbit.**—*Ibid.* **142.** 179–181. **117**

The authors report in detail the effects of milk anaemia on the blood picture of the rat and the effects of feeding Fe and Cu to milk-anaemic rats.

Young rats were made anaemic on an exclusive diet of cow's milk. When the condition became severe one group received 0·5 mg. of pure Fe per rat per day, and another group received 0·05 mg. of Cu per rat per day. The control rats were litter mates which received stock diet. The results of the experiments are tabulated. There was a general lack of haemoglobin response in the Fe-fed rats. A summary of the blood picture of normal and anaemic rats is given.

A deficiency of Fe or Cu or both produces a microcytic and hypochromic anaemia. When pure Fe is fed to milk-anaemic rats the anaemia remains unchanged except that the mean cell volume increases significantly but does not become normal. When Cu is fed to milk-anaemic rats the anaemia becomes more pronounced.

II. The present paper extends these studies to the rabbit. At the age of two weeks the young rabbits were given access only to milk, which after weaning was fed *ad lib.* When about 8–10 weeks old the haemoglobin fell to about 4 g. per 100 ml. of blood. Some of the rabbits were fed 2 mg. of pure Fe per rabbit per day. Another group received 0·2 mg. of Cu per rabbit per day. Blood analyses from these two groups are compared with the blood analyses of milk-anaemic rabbits and of litter mates which had received stock diet. Tables of the analysis are given.

A deficiency of Fe or Cu or both in the diet leads to a hypochromic and microcytic anaemia.—E. M. J.

WARREN, C. O., SCHUBMEHL, Q. D., & WOOD, I. R. (1944.) **Studies on the mechanism of cobalt polycythemia.**—*Amer. J. Physiol.* **142.** 173–178. **118**

In a study on the mechanism of Co polycythaemia, BARRON & BARRON proposed that the condition was due to inhibition by Co of the respiratory function of immature red cells. A small amount of Co inhibited the respiration *in vitro* of various tissues, especially reticulocytes and bone marrow.

In the present investigation the authors repeated these experiments and studied several other possible modes of action of Co but the results in each instance were negative. The *in vitro* respiration of both normal and polycythaemic marrow was not altered by substituting polycythaemic for normal serum. It was found that the effects of Co were independent of the peripheral innervation of the marrow and did not evolve morphological changes in the marrow vessels.

The action of Co in inducing polycythaemia was not explained but several possibilities were suggested for further study.—E. M. J.

SMITH, S. E., MEDLICOTT, M., & ELLIS, G. H. (1944.) **Manganese deficiency in the rabbit.**—*Arch. Biochem.* **4.** 281–289. **119**

Two groups of eight and seven rabbits respectively, from four weeks of age were fed on a basal diet of milk powder *ad lib.* and a supplement of 2 mg. Fe, 0·2 mg. Cu and 0·1 mg. pyridoxine a day. The group of seven animals was given in addition 5 mg. Mn per rabbit per day. At 18 weeks of age the animals were killed for autopsy.

Six of the seven surviving rabbits on the Mn-deficient diet developed gross deformities of the front legs when 7–14 weeks old. There was a decrease in the breaking strength, weight, density and ash content of the humerus of the Mn-deficient animals. The crookedness or "bowing" of the bones was confined to the radius and ulna.

A microscopic study of the head of the humerus showed a narrowing of the zone of provisional calcification due to a reduction in the number of cartilage spicules and a deficiency of spongy bone. There was a decrease in the growth and a decrease in the Mn content of the liver of the Mn-deficient rabbits compared with the controls which remained in excellent condition and in which there were no deformities of the legs. —R. ALLCROFT.

FRICKE, E. F. (1945.) **Molybdenum deficiency in the north-east.**—*Tasm. J. Agric.* **16.** 1–4. **120**

Pastures of subterranean clover on certain areas in the Cressy-Longford district of Tasmania proved difficult and costly to maintain. Experimental plots treated with finely ground molybdenum at the rate of 1 lb. per acre combined with either lime or superphosphate showed very marked improvement over untreated

control plots and over plots treated with lime and superphosphate without molybdenum.

No reference is made to the health of livestock grazed on these molybdenum-deficient soils.—M. C.

RADELEFF, R. D. (1945.) **Evidence of an anti-vitamin factor in raw mutton and chevon.**—*Vet. Med.* **40.** 280. **121**

R. reports the case of a 14-month-old bitch with paralysis of the posterior limbs which had had an attack of distemper complicated by pneumonia two months previously. The diet had consisted entirely of raw mutton and chevon [? goat mutton]. After administration of thiamine, ascorbic acid and a liberal supply of a proprietary vitamin B complex preparation, together with some sulphonamide treatment, the animal made a complete recovery. It is suggested that there is some factor in raw meat which, if consumed by a dog, destroys or inhibits the action of some or all of the B complex vitamins.—R. ALLCROFT.

See also absts. **32** (riboflavin in avian malaria), **83** (vitamin C action in schistosome trematodes), **98** (in dog ascarids), **103** (diet and tar cancers), **105** (vitamin A in contagious keratitis), **106** ("pullet disease" and nutrition), **130** (ascorbic acid in bovine alimentary tract), **179** (vitamin A and acetonaemia), **205** (vitamin A deficiency in cattle), **205** (locomotor incoordination in pigs).

PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

—. (1945.) **Annual review of physiology. Vol. VII.** [Edited by LUCK, J. M., & HALL, V. E.] pp. vii + 774. Stanford University P.O., California: Annual Reviews, Inc. $5.00. **122**

Although the articles in this volume are concerned mainly with the human aspect of physiology several of the chapters will be of interest to veterinarians. The chapter on "Hormones in reproduction" by R. K. MEYER deals with reproductive cycles in mammals and birds, gonadotropins, sex hormones and the mammary gland. In "Metabolic functions of the endocrine system" by D. J. INGLE, a critical review is given of recent studies concerning the biological effects of the hormones. The chapter on "Blood" by V. JOHNSON, L. W. FREEMAN & J. LONGINI deals with coagulation, natural blood substitutes, the role of fat ingestion in blood destruction, pernicious anaemia, haematopoiesis, haemolysis and plasma proteins.

The chapter on "Pharmacology" by K. K. CHEN deals with several topics of current interest instead of with a single subject as in previous volumes. These topics include discussions on the digitalis group, sympathomimetic amines, convulsant barbituric acids, thiourea and thiouracil, alloxan and hepatotoxic alkaloids.

Other chapters are as follows: "Permeability," by S. C. BROOKS; "The physical properties of protoplasm," by W. SEIFRIZ; "The physiological effects of radiant energy," by S. WARREN; "Physiological aspects of genetics," by S. WRIGHT; "Developmental physiology," by D. H. BARRON; "Water metabolism," by I. MCQUARRIE; "Physiological effects of heat and cold," by A. HEMINGWAY; "Energy metabolism," by H. E. HIMWICH; "The peripheral circulation," by E. M. LANDIS; "Respiration," by C. F. SCHMIDT; "Muscle," by D. Y. SOLANDT; "Digestive system," by B. P. BABKIN & M. H. F. FRIEDMAN; "Kidney," by H. LAMPORT; "The lymphatic system," by C. K. DRINKER; "Heart," by H. E. ESSEX; "Electrical activity of the brain," by F. A. GIBBS; "Conduction and synaptic transmission in the nervous system," by G. P. MCCOUCH; "The somatic functions of the nervous system," by M. A. KENNARD; "The special senses," by J. M. D. OLMSTED; "Exercise," by C. L. TAYLOR; "Physiological psychology," by C. P. STONE; "Applied physiology," by J. H. COMROE, Jr., & R. D. DRIPPS, Jr. Author and subject indexes are given.—R. ALLCROFT.

—. (1943.) **Annual review of biochemical and allied research in India, Vol. XIII for 1942.** pp. 101. Bangalore: Society of Biological Chemists, India. 8vo. Rs.3 or 6 sh. **123**

The review consists of 393 papers, divided into 11 sections. Important contributions are summarized below.

The section on enzymes deals with the study of the mechanism of β-amylase inhibition by vitamin C, free and bound phosphates in seeds, the nature of the active group in papain, commercial possibilities of milk-coagulating enzymes of purely vegetable origin, the nature of the proteolytic system in whole blood, and methods for the determination of prothrombin level in blood.

The section on vitamins is concerned with the modification of some existing methods of estimating carotene, vitamin B_1, riboflavin and nicotinic acid, the analysis of these vitamins and of vitamin D by modified methods, the utilization of chromatographic methods in studies of carotene absorption, and the influence of vitamin D on the absorption of calcium.

The section on general nutrition considers dietary surveys, the aetiology of deficiency diseases, *e.g.*, keratitis, infantile beri-beri, pellagra, scurvy and others of non-specific type, mineral deficiency and the availability of minerals from various dietary sources, the war-time food situation in India, and measures to be adopted to ensure optimum nutrition.

The section on human physiology deals with the estimation of age, blood chemistry, blood grouping, the circulatory, digestive and haemopoietic systems, health investigations, and the reproductive, respiratory and urinary systems.

The section on animal nutrition discusses the introduction of newer types of fodder plants in India, the quality of some indigenous grasses and cultivated legumes and non-legumes with progressive maturity and frequency of cutting, the effect of maturity, hay making and storage conditions on the carotene contents of fodders, carotene metabolism in cows and bullocks on different levels of carotene intake, the carotene and vitamin A potency of milk and blood plasma at different levels of carotene ingestion, establishing the presence of large amounts of oxalates in some commonly used Indian feeding stuffs, the fate of oxalates in ruminant metabolism and their influence on calcium assimilation, composition and nutritive value of some cereal straws as affected by alkali treatment, the association of fainting fits in calves with low serum magnesium concentration, the excretion of phosphatase in the faeces of normal and fasting goats, the estimation of phytin in cereals and pulses with trichloracetic acid as extractive, the semi-micro estimation of allantoin in the urine of farm animals, the relative value of two supplements containing separated milk and groundnut meal for the growth of chicks, the biological values of proteins in the milk of cows, goats and buffaloes, and the reliability of freezing-point tests for detecting adulteration of milk.

The section on protein, fat, carbohydrate and mineral metabolism includes studies on the digestibility and biological value of proteins from various animal and vegetable sources and the factors which influence these values in the diet of rats, fatty acid constituents in the oils from seeds, the calcium and phosphorus content of the bones of fishes, calcium retention after

the administration of anterior pituitary hormones, the effect of oxalic acid in some leafy vegetables on calcium assimilation by rats, and partition of phosphorus in the brains of several species of animals.

Contributions to the section on pharmacology concern the circulatory and respiratory effects of camphor and its liquid substitutes, several alkaloids and preparations from cobra venom, and the effect of cobra venom on the proteolytic system in blood; the urinary excretion of hexamine and formaldehyde in persons given hexamine; the keeping qualities of liquid preparations of ergot and tincture of digitalis and the standardization of the latter by the g. pig method, natural and synthetic anti-malarial substitutes for quinine, the remedial and toxic effect of the sulphonamides in various infectious diseases with observations on the haemopoietic system, the use of an indigenous plant, *Vitex pedunculans*, in blackwater fever and of *Euphatorium ayapana* as a haemostatic agent, the Rideal-Walker coefficient values of the essential oils with typhoid bacilli, and the use of snake venoms and their preparations in different diseases.

The section on human pathology includes studies on brucellosis, *Leptospira icterohaemorrhagiae* infection, rabies, rat bite fever and salmonella infection.

The section on the chemistry of plant products includes research on the isolation and composition of essential and of fixed oils, sterols and lactones, colouring matters, alkaloids and glucosides and studies on the cyanogenetic principle in some exotic fodder grasses.

—S. C. Ray.

Sheline, G. E., Chaikoff, I. L., Jones, H. B., & Montgomery, M. L. (1943.) **Studies on the metabolism of zinc with the aid of its radioactive isotope. I. The excretion of administered zinc in urine and feces. II. The distribution of administered radioactive zinc on tissues of mice and dogs.**—*J. biol. Chem.* **147.** 409–414 and **149.** 139–151. **124**

I. The excretion of zinc into urine and faeces was studied by tracing and estimating the radioactive isotope, Zn^{65}, after it had been injected intravenously into mice and dogs. The great sensitiveness of the methods for detecting and estimating the radioactive elements made possible the administration of such minute quantities of Zn (0·33 μg. into mice and 5·7–6·5 μg. into dogs) that the body content of this element was not appreciably increased. The experimental results could therefore be considered to present the endogenous picture of Zn excretion.

In mice, 20% of the injected radioactive Zn was eliminated by way of the gastrointestinal tract in the first ten hours and 50% in 170 hours, whereas only 2% was passed into the urine in 170 hours, although the first fractions to enter the urine made an early appearance (0·2% in the first two hours).

The faecal excretion of approximately 25% of the radioactive Zn injected into dogs took 12–15 days and only 1·2–4·7% was passed into the urine in the same period. It is concluded that a large part of the body Zn is normally excreted by way of the gastrointestinal tract. The experimental technique is described.

II. The distribution of intravenously injected Zn n the bodies of mice and dogs and the rate of uptake and loss of zinc by different tissues was measured by means of the radioactive isotope, Zn^{65}. Injected radioactive Zn disappeared rapidly from the plasma and was no longer detectable in the plasma of the dog ten hours after injection. On the other hand, radioactive Zn quickly appeared in the red blood cells. Its concentration in these cells continued to increase throughout the entire 170 hours of observation until finally 2–4% of the total amount injected was present. In all body tissues, there was an early appearance of radioactive Zn but marked differences existed in its concentration and rate of turnover in different tissues.

The highest concentrations of radioactive Zn were found in the liver, pancreas, kidney and pituitary gland and its rate of turnover was also highest in these tissues. In the early stages the liver, on account of its size and high concentration of Zn, held the largest fraction of the injected radioactive Zn, 38% being present in the liver of the dog three hours after administration. Only about one-tenth of this amount was present in the liver towards the end of the observations. Nevertheless, the Zn content of the liver was exceeded at this stage only by that of the whole striated musculature. The radioactive Zn which disappeared from the liver was not entirely lost by way of the bile, faeces and urine and it was evident that it was redistributed to other tissues from the liver.

Radioactive Zn was rapidly deposited in and removed from the gastrointestinal tract. In the dog, the entire tract contained 13% of the injected radioactive Zn three hours after administration and 5% was still retained after 170 hours. Nervous tissue, bone, skin and skeletal muscle were characterized by a slow deposition of radioactive Zn increasing with time or by the maintenance of very small amounts deposited in the early stages; the activity of these tissues towards Zn therefore stood in marked contrast to that of the liver, pancreas and kidney. Zn metabolism was of an intermediate order in the spleen, lymph nodes, thymus, lungs, heart, adrenal glands, etc.—W. R. Muir.

*Veer, W. L. G., & Gaillard, P. J. (1942.) **Melanin and its precursors. III. The influence of adrenochrome on the migration of bone-marrow "in vitro" compared with that of liver extract.**—*Rec. Trav. chim. Pays-Bas.* **61.** 763–766. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 41–42.] **125**

Earlier investigations showed the existence of a relationship between the production of melanin and haemopoiesis. It has now been shown that 5–6-dihydroxy-indole-2-carboxylic acid, a derivative of tyrosine and a precursor of melanin, possesses anti-anaemic activity. In pernicious anaemia the amount of melanophore hormone in the pituitary is extremely small. Adrenochrome, a derivative of adrenalin and also a precursor of melanin, was also studied to see if it possessed any haemopoietic activity. It was found to have a pronounced action on the migration of bone marrow cells *in vitro*. The effect was most marked at dilutions of 1 : 500 and 1 : 1,000. The mode of action of adrenochrome is, however, different from that of the anti-anaemic factor extracted from liver tissue.

—E. G. White.

Reid, G. (1943.) **A preliminary note on the relationship of the blood platelets to the mechanism of haemostasis.**—*Med. J. Aust.* Sept. 25th. pp. 244–246. [Author's summary copied *verbatim*.] **126**

By liberating a vasoconstrictor substance when they break down, the blood platelets play a part in haemostasis from arterioles and larger vessels. The name "thrombocytin" has been suggested for this substance. Patients suffering from thrombocytopenic purpura, with prolonged bleeding times and a reduced number of platelets, yield serum possessing only feeble vasoconstrictor activity; but there is no evidence that the vasoconstrictor substance derived from the platelets causes capillary constriction. So far as the liberation of "thrombocytin" is concerned, the blood platelets of a patient suffering from athrombocytopenic purpura (hereditary thrombasthenia) did not differ from normal platelets.

TKACHENKO, A. F. (1940.) Morfologiya eritroblasticheskikh i mieloblasticheskikh kletok kostnovo mozga zdorovykh loshadeĭ. **[Morphology of erythroblasts and myeloblasts in normal horse bone marrow.]** —*Trud. Troitsk. vet. Inst.* No. 3. pp. 171–198. **127**

The weights of the bone marrow of two horses aged eight years and ten years were 7·9 kg. and 8·76 kg. respectively. T. emphasizes that the bone marrow is thus a very bulky organ, weighing even more than the liver, which is described in text books on anatomy as the heaviest organ in the body. He disagrees with Skiba's differentiation between red bone marrow in young and adults, which in his opinion is superfluous since he found fat cells in the bone marrow of the femur in two-month-old foals, while replacement of red marrow by yellow can be observed macroscopically in yearlings. In horses of 10–12 years old, the yellow marrow replaces about half of the femur marrow substance and at 15–16 years the yellow marrow predominates. In normal animals the replacement of marrow is not equal in both extremities. In human beings the replacement of red marrow by yellow is in a centrifugal, and the replacement of yellow by red in a centripetal, direction.

Amongst cell elements, the largest proportion found was the erythroblastic group, especially basophile and polychrome erythroblasts. Megaloblasts were found only in pathological conditions or in horses with a history of equine infectious anaemia, piroplasmosis etc.

Among myeloid cells 3·0–3·5% were myeloblasts and 6·0–8·0% promyelocytes; 35·0–41% neutrophile myelocytes; 3·5–4·0% eosinophiles and 0·1–0·5% basophiles. An average of 90 megakaryocytes were found in each counting square unit.—A. MOLDAWSKY.

NECHELES, H., & OLSON, W. H. (1944.) **Note on the "digestion" of metal in the stomach.**—*J. Lab. clin. Med.* **29.** 687–688. **128**

The "digestion" of the metal of cannulae used for the draining of gastrotomies and Pavlov pouches was observed. Cannulae made of two pieces of metal soldered together were "digested" at the joint, hard solder and silver brazing being dissolved more slowly than soft solder. Cannulae constructed in one piece were also "digested". Stainless steel was most easily destroyed and brass was the most resistant metal employed. A plastic cannula has been constructed which it is hoped will resist stomach acid better than the metal ones.—T. E. GIBSON.

HASTINGS, E. G. (1944.) **The significance of the bacteria and protozoa of the rumen of the bovine.**—*Bact. Rev.* **8.** 235–254. **129**

The gradual development of a specialized ruminant stomach and its associated microflora has enabled ruminants to ingest food rapidly, a condition of great advantage to the animal in its feral state, and to utilize fibrous foods. These two abilities seem to account for the fact that ruminants at the present time predominate among the larger mammals of the world.

Cellulose and related components of the food are made available to the host by the action on particles of plant material of enzymes produced by micro-organisms, and H. considers that the host has the opportunity to use the breakdown compounds resulting from this action only in the form in which they are built into the bacterium and protozoon (and rendered available after the death of the micro-organisms). The microflora peculiar to the ruminant alimentary tract (ingested foreign micro-organisms are said to be of no significance) is anaerobic and, consequently, little energy is lost as heat in the food chain that is envisaged.

The energy made available to the animal from roughage varies directly with the time it spends in the rumen; this is not necessarily true for foodstuffs such as grain, which pass rapidly to the abomasum, and as starch and protein can presumably be digested in the normal manner in the small intestine, energy is not lost but may even be saved for the animal by the rapid passage through the rumen of concentrated foodstuffs.

The hypothesis is put forward that the microflora of the rumen does not vary widely with changing diets. The corollary of this is that any class of nutriment will be of much the same value to the host if it is a suitable medium for the micro-organisms in the rumen. Many factors aid in maintaining a constant microflora, the outstanding one being the copious secretion of saliva, neutralizing the acid products of carbohydrate fermentation.—A. T. PHILLIPSON.

*OLSOVSZKY, E. (1943.) **[The lactic acid and ascorbic acid contents of the stomach and intestinal contents of cattle.]**—*Inaug. Diss., Budapest.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* Feb. 4th. 48. (1944).] **130**

Small quantities of lactic acid were found in the rumen contents of cows (20 mg. %) and the small intestine of calves (1·6 mg. %). The concentration of ascorbic acid was greatest in the omasum and small intestine (15 mg. %). The concentrations of both acids were least in the caecum.—A. T. PHILLIPSON.

TRAUTMANN, A. (1943.) Über die Motorik des Dickdarmes bei Haussäugetieren. **[Motility of the large intestine in domestic animals.]**—*Dtsch. tierärztl. Wschr.* **51.** 87–89. **131**

The large intestine of sheep and goats consists of two functional parts; the proximal part delays the passage of digesta so that dehydration can occur, while the distal part is excretory.

The movements observed involved the mixing and transportation of digesta.—A. T. PHILLIPSON.

BRANDT, H. (1944.) Über das Vorkommen eines Rohrzucker spaltenden Fermentes im Dünndarm des Rindes. **[A sucrose-splitting ferment in the small intestine of cattle.]**—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **52/50.** 183–185. **132**

Extracts of the intestinal mucosa of the ox contained invertase which was active between the limits of pH 4·5 and pH 7. The contents of the small intestine contain no invertase and evidence is presented to show that invertase is present in the tissue juice rather than in the intestinal secretions.—A. T. PHILLIPSON.

BODIAN, D., & MELLORS, R. C. (1945.) **The regenerative cycle of motoneurons, with special reference to phosphatase activity.**—*J. exp. Med.* **81.** 469–488. [Authors' summary copied *verbatim.*] **133**

The regenerative cycle of motoneurons after axon amputation is described, and an attempt made to correlate morphological and chemical events in cell bodies with the growth requirements of regenerating axons. The "normal" pattern of Nissl material in the cell is considered to be the resultant of a steady state in cytoplasmic nucleoprotein. Chromatolysis is then interpreted as a shift of the balance of nucleoprotein turnover in favor of degradation. The rapid early depletion of Nissl substance in chromatolysis is ascribed to the increased growth requirements created by the active early sprouting of the regenerating axon. Acid phosphatase activity begins to increase above normal levels during this period in the region of nucleoprotein degradation.

The recovery period of chromatolysis due to axon section coincides in time with the phase of gradual lengthening of the regenerating axon ,and is thought to

represent a gradual restoration of the balance of nucleoprotein degeneration and synthesis. During this period acid phosphatase activity is at its height in the region of transformation of Nissl substance, and later declines to normal levels when the original pattern of Nissl bodies is restored.

The transformation of cytoplasmic nucleoprotein which occurs in chromatolysis after axon section, with the probable liberation, and depletion, of nucleotides, associated with acid phosphatase activity, suggests the hypothesis that liberated nucleotides or nucleotide compounds may pass down the organization of the newly formed axon. This type of activity would not be incompatible with the ideas previously expressed of a continual function of Nissl substance in maintaining the integrity of the large volume of cytoplasm represented by the axon, as well perhaps as the associated myelin sheath.

BARCROFT, J., DANIELLI, J. F., HARPER, W. F., & MITCHELL, P. D. (1944.) **Wharton's jelly considered as a conducting path.**—*Nature, Lond.* **154.** 667. **134**

A dis-azo dye, related to trypanblue and linked to serum albumin, was injected into Wharton's jelly of the umbilical cord of the foetus of the sheep. The dye passed slowly to the foetus and three hours later was observed to have spread over the allantois, to the upper portions of the bladder, to the umbilical arteries and the adjacent peritoneal reflexions. As Wharton's jelly extends in the umbilical cord of the sheep from the cotyledons to the foetus, it is suggested that it constitutes a path, other than a purely vascular one, by which water at least can reach the foetus.—A. T. PHILLIPSON.

HUGGINS, C. (1945.) **The physiology of the prostate gland.**—*Physiol. Rev.* **25.** 281–295. **135**

At frequent intervals the prostate gland excretes small amounts of fluid which are discharged into the urine. The secretion is greatly augmented by parasympathetic stimulants. The activity of the prostate is primarily a function of androgenic activity and is depressed by oestrogens and following castration. The prostate is not an endocrine organ and the main function of its secretion is to add volume to the semen and perhaps to increase the motility of the spermatozoa. Prostatic fluid contains a vasodepressor substance and large amounts of acid phosphatase, the function of the enzyme being still unknown. Prostatic activity may be regarded as a secondary sex characteristic since it does not occur until puberty is reached; it is not limited to the male sex, prostatic tissue being found in certain female animals.—J. A. NICHOLSON.

HARVEY, C., & JACKSON, M. H. (1945.) **Assessment of male fertility by semen analysis. An attempt to standardise methods.**—*Lancet.* **249.** 134–137. **136**

The authors consider that a determination of the density, morphology, motility and viability of the spermatozoa gives the most reliable indication of fertility. In order to standardize the results, minimum values have been laid down for these four factors.

The density must exceed 50 million per ml.; 65% of the spermatozoa must show normal morphology; the basic motility after one hour's incubation at 37°C. must be 50%; and the viability, that is the ratio of the number of spermatozoa motile after three hours' to the number motile after five hours' incubation must be 1·0 : 0·75. These values apply to specimens the examination of which begins within 30 min. of ejaculation: if the age of the specimen is greater than this, due allowances must be made. Male infertility is indicated when all four factors fail to reach a minimum value. A detailed description of the technique used is given.

—J. A. NICHOLSON.

DUARTE, A. T. (1941.) La gradualità del raffreddamento dello sperma e la sua conservazione extra-organismo. **[Effect of rate of cooling on the preservation of sperm.]**—*Rev. Med. vet., Lisboa.* **36.** 139–153. [In Italian: English, French and German summaries.] [Author's English summary slightly amended.] **137**

The author established that the temperature in the test-tube containing the sperm (wrapped in a thick layer of cotton wool and enclosed in a rubber bag) put in a thermos flask with crushed ice, descends from the level of the surrounding air (18°–25°C.) to 0°C. in about an hour (55–93 min.), *i.e.*, in the same time that most workers think necessary for the gradual cooling of the sperm for storage.

It seems furthermore that activity of the spermatozoa contained in the test-tube does not differ whether the cooling is gradual or sudden. And finally if the test-tube is not previously wrapped in cotton wool but placed at once in the thermos flask, the activity of the sperm remains practically the same as that of the sperm in the test-tube wrapped in cotton wool and afterwards enclosed in the rubber bag.

COONEY, W. T. (1943.) **Preincubation humidity variation effects on chicken egg hatchability.**—*Tech. Bull. Ore. agric. Exp. Sta.* No. 2. pp. 27. **138**

A study of five hatches involving 5,239 eggs showed that a high relative humidity during the holding periods of hatching eggs definitely increased hatchability.

Curves and tables are supplied giving a record of the average relative humidity and temperatures at which the various hatches were held prior to incubation, together with full details as to the fertility and hatchability of each hatch.—J. D. BLAXLAND.

LISSOT, G. (1944.) Température de la poule couveuse. **[The temperature of eggs under a broody hen.]**—*Bull. Acad. vét. Fr.* **17.** 314. **139**

By means of a recording thermometer with its bulb on a level with the tops of the eggs, records were obtained of the temperature under a broody hen. The experiments were made in the month of May when the mean room temperature was 16°C. and Rhode Island Red hens aged two years were used.

Regular fluctuations of temperature were noted at intervals of 30 min., the difference between the minima and maxima varying from a fraction of a degree to nearly 2°C. The highest temperatures recorded were about 43°C. or, exceptionally, 44°C. The lowest were 38°–40°C. or, exceptionally, 33°C. When the hen was absent from the nest for about 30 min. the temperature fell about 10°C. and returned to its former level half an hour after the hen had resumed sitting. The possible applications of these findings to artificial incubation are indicated.—M. C.

DE BOISSEZON, P., & VALDIGUIÉ, P. (1942.) Sur les lipides du corpuscle carotidien du cheval. **[Lipoids of the carotid body of the horse.]**—*C. R. Soc. Biol. Paris.* **136.** 778–779. **140**

The authors give details of the chemical analysis of two groups [? each] of 30 carotid bodies. They state that, since there is an absence of adrenalin, the bodies cannot be regarded as sympathetic ganglia. They contain, however, an abundance of galactolipoids and phosphoaminolipoids and this lends weight to the hypothesis of Goormaghtigh and Schumacher that the organs are part of the system of non-chromaffin ganglia which are under the control of the vagus.—H. V. H.

See also absts. **115** (plasma protein production), **116** (iron and copper in anaemia), **113** (cobalt polycythaemia), **194** (erythrocyte sedimentation rate), **195** (blood transfusion), **196, 197** (mitogenetic radiations from blood).

POISONS AND POISONING

LAWRENCE, J. S. (1945.) **Acute poisoning due to petrol vapour.**—*Brit. med. J.* June 23rd. 871–873. **141**

Two cases in human beings of acute poisoning due to petrol vapour are described. The aetiology, clinical features and pathology are reviewed.—H. PAVER.

—. (1945.) **Methyl bromide poisoning.**—*Brit. med. J.* June 23rd. 882. **142**

This is a brief general article on the toxicology of methyl bromide especially with reference to human beings. A reference to a paper on the toxicity of the substance in animals is given.—H. PAVER.

SALIKOV, M. I. (1944.) Novoe kormovoe zabolevanie loshadej i krupnovo rogatovo skota. **[New form of food poisoning in horses and cattle (due to the fungus** *Claviceps paspali*).]—*Veterinariya, Moscow.* No. 2–3. pp. 41–43. **143**

In August 1942 a serious outbreak of food poisoning among horses, cattle and pigs which affected the central nervous system and terminated in complete paralysis occurred in one of the coastal districts of South Georgia. Transferring animals in the early stages of the disease to new pasture brought about rapid improvement with recovery after three days. Isolated cases occurred in hilly areas, but only when hay or grass had been brought from the low-lying damp ground associated with the poisoning.

It was established that the disease was due to *Claviceps paspali*.—E. W. LEWIS.

FITZHUGH, O. G., NELSON, A. A. & CALVERY, H. O. (1944.) **The chronic toxicity of ergot.**—*J. Pharmacol.* **82.** 364–376. **144**

Rats fed 1, 2 and 5% powdered crude ergot in adequate or low-protein diets showed toxic effects. The growth rate was retarded, especially in male animals during the early growing period. With a diet containing adequate amounts of protein, the growth rate of female rats was not retarded with an ergot level of 1% and 2%; on a low-protein diet all growth rates except for the female rats on the 1% ergot were significantly lower than those of the controls.

Histologically typical neurofibromas developed on the ears of a high percentage of rats fed 5% ergot; incidence was less at the 2% level, rare at a level of 1% and did not occur in the controls. A low-protein diet somewhat favoured the production of ear tumours.

Spontaneous tumours which occurred rather frequently in the older rats of this stock and which were mostly malignant in type, the commonest being lymphosarcoma of the lung and embryonal sarcoma of the kidney, were about doubled in incidence in the ergot-fed rats.

Two other lesions, necrosis of the lower ends of the renal pyramids and enlargement of the ovaries from marked corpus luteum hyperplasia, were frequently caused by the feeding of ergot. No cutaneous gangrene and no vascular lesions attributable to ergot were observed. The exact constituent of the crude ergot responsible for the tumour production was not determined, but the authors suggest that the fact that one rat on ergotoxine did develop a typical neurofibroma of the ear may be of significance.—H. PAVER.

GALLIE, J. G. E., & PATERSON, J. D. (1945.) **Charlock poisoning of lambs.**—*Vet. Rec.* **57.** 198. **145**

The environmental circumstances of this outbreak, in which 10 lambs died, were such as to suggest poisoning by charlock. Symptoms prior to death included diarrhoea, straining, extreme depression and rapid and laboured respirations. The conjunctivae were very injected and slight frothing from mouth and nostrils was apparent. The P.M. examination of one lamb revealed gastritis and enteritis, extreme congestion of the mesenteric blood vessels, slight inflammation of the eosophagus and trachea and macroscopic nephritis of both cortex and medulla. The lungs, liver, bladder, serous membranes and heart were normal in appearance. —H. PAVER.

ESSEX, H. E. (1945.) **Certain animal venoms and their physiologic action.**—*Physiol. Rev.* **25.** 148–170. **146**

The animal poisons dealt with are those of jelly-fish, bees, scorpions, spiders, lizards and snakes. The chemistry, pharmacology, symptomatology, pathology, treatment, immunity and use of the poisons as therapeutic agents are presented.—H. PAVER.

NELSON, A. A., DRAIZE, J. H., WOODARD, G., FITZHUGH, O. G., SMITH, R. B., Jr., & CALVERY, H. O. (1944.) **Histopathological changes following administration of DDT to several species of animals.**—*Publ. Hlth Rep., Wash.* **59.** 1009–1020. **147**

117 animals, including six dogs, three cows, three sheep and a horse, were given D.D.T. by various routes and in varying doses. Microscopic examination was made of the tissues of those animals which died or were killed *in extremis*.

The symptoms exhibited are dealt with very briefly as these and details of the experimental procedures are to be published separately. The most striking symptom was muscular tremors, especially in the extremities, which varied from fine to coarse and continued in many instances for days and even weeks and in a few cases for months. These tremors were produced in rabbits, dogs, rats, mice, chickens, g. pigs and two of the three cows, but not in any of the other large animals. Macroscopic changes were not conspicuous in any species. In those animals in which the drug had been administered by inunction with a bland oil there were varying degrees of scaling of the skin but this was always slight.

The most frequent and most characteristic microscopic change was a moderate degree of liver damage. This was most commonly a centrolobular necrosis rather reminiscent of human subacute degeneration of the liver, but not as extensive nor as intense. This lesion was not observed in chickens. Local necrosis of small segments of voluntary muscle was frequently found at the higher dosage levels. A moderate degree of colloid depletion of the thyroids was seen in two dogs, four rats and two g. pigs. This change was not seen in rabbits.

In view of the severe muscular tremors which followed large doses, the brain and spinal cord were collected and examined immediately after death. Over 40 spinal cords and over 60 brains were examined but no changes could be seen which were not present in control preparations similarly fixed and stained. In contrast to those of the other species, the brains of five out of eight rabbits showed a focal granulomatous encephalitis, histologically identical with the type of lesion caused by *Encephalitozoon cuniculi* and which was seen in control rabbits. The incidence, however, was markedly higher in rabbits which had received D.D.T. Whether D.D.T. had allowed the activation of a latent infection is an open question.

The paper does not give many details regarding dosage. The dosage rate in the larger animals (cows, sheep and horse) was 100–200 mg. per kg. body weight per day for three weeks. About four times as much D.D.T. was required to produce a given effect by inunction as by oral administration.—M. C.

HOBBS, F. B. (1944.) **A fatal case of mustard gas poisoning.**—*Brit. med. J.* Sept. 2nd. 306–307. **148**

Observations on a family accidentally contaminated with mustard gas and the P.M. findings on the one patient who died are recorded. Death occurred on the twelfth day after the accident. The result of the P.M. examination is summarized as follows: "A membranous ulcerative laryngitis and a membranous ulceration of the main air tubes of the lung had led to a massive collapse of that organ—the immediate cause of death. Further changes were noted in the glands of the body and in the bone marrow, consistent with and consequent upon the changes in the blood. The cause of death was: (a) agranulocytosis; (b) multiple burns from mustard gas".—H. PAVER.

PHARMACOLOGY, THERAPEUTICS AND DISINFECTION

FULTON, J. D., & GOODWIN, T. W. (1945.) **The effect of light on various aromatic diamidines in the solid state.**—*J. Pharmacol.* **84.** 42–45. **149**

The change effected by light was investigated on three diamidines by biological and spectrographic methods. The dihydrochlorides of 4 : 4′-diamidinostilbene, 4 : 4′-diamidinotolane and 4 : 4′-diamidino-α-monomethylstilbene, all of which undergo toxic changes with partial loss of therapeutic activity when exposed to light in aqueous solution, were exposed in the solid state to light and air for periods of 8–14 months.

Samples were taken at intervals and examined biologically for toxicity in mice and spectrographically.

From being colourless or faintly yellow at first the substances became bright yellow in the case of stilbamidine and yellowish brown in the case of the other two on exposure. After eight months' exposure solutions were made of each substance and their absorption spectra compared with those of similar solutions of unexposed samples. No significant change had taken place in the spectra and the maximum tolerated dose of each substance was unaltered.

In the case of stilbamidine, with minimal doses the therapeutic activity of the exposed substance was slightly reduced and the bright yellow variety underwent the same toxic changes in aqueous solution as the fresh material.

It is concluded that the dihydrochlorides of the aromatic diamidines investigated may safely be used clinically after long exposure to air and sunlight in the solid state.—E. M. J.

I. BEYER, K. H., WOODWARD, R., PETERS, L., VERWEY, W. F., & MATTIS, P. A. (1944.) **The prolongation of penicillin retention in the body by means of para-aminohippuric acid.**—*Science.* **100.** 107–108. **150**

II. BEYER, K. H., PETERS, L., WOODWARD, R., & VERWEY, W. F. (1944.) **The enhancement of the physiological economy of penicillin in dogs by the simultaneous administration of para-aminohippuric acid. II.**—*J. Pharmacol.* **82.** 310–323. **151**

I. A preliminary account.

II. Experiments were made on dogs to find a means of increasing the physiological economy of penicillin. The sodium salt of *p*-aminohippuric acid was administered intravenously, a priming dose being followed with a continuous infusion. Penicillin was then administered as a single intravenous injection. Control experiments were made in which penicillin but no *p*-aminohippuric acid was injected. It was found that where *p*-aminohippuric acid was used there was a prolonged maintenance of a determinable plasma concentration of penicillin, a marked prolongation of the time during which it was excreted, a definite decrease in the rate of excretion, and a marked decrease in the amount recovered in the urine in a given period of time.

p-Aminohippuric acid suppressed the clearance of penicillin and this suppression was more or less proportional to the decreased *p*-aminohippuric acid clearance as the plasma concentration of the latter compound was increased.

It was concluded that the effects were produced by a competition between *p*-aminohippuric acid and penicillin for excretion by the renal tubular epithelium.

Tables and graphs are given.—E. M. J.

RAIZISS, G. W., SEVERAO, M., & MOETSCH, J. C. (1945.) **Diasone: its toxicity and therapeutic effectiveness.**—*J. Lab. clin. Med.* **30.** 317–326. **152**

Diasone was found to be less toxic for mice, rats, rabbits and dogs than the majority of the sulphonamides, including sulphadiazine. It was much less toxic than diaminodiphenylsulphone, and possessed a high therapeutic effectiveness in mice infected with β-haemolytic streptococcus and with type II pneumococcus. Mice survived oral dosage up to about 4 g. per kg. body weight, rabbits up to 3·5 g. per kg. and rats up to 7 g. per kg. Mice tolerated a diet containing 0·75% of diasone for 21 days, rabbits survived 1 g. per kg. administered intravenously for 30 days, while dogs survived 0·3 g. per kg. administered daily (equivalent to 20 therapeutic human doses) for 95 days and longer. Data are given of the blood levels of diasone attained in mice, rabbits and dogs; the urinary output of diasone was found to be incommensurate with the amounts ingested. The faecal elimination of diasone is negligible.—A. B. P.

WAKELEY, C. P. G., & BLUM, G. (1945.) **Clinical trial of UFI. A new compound of urea and iodine.**—*Lancet.* **249.** 42–44. **153**

UFI consists of a mixture of methylene-di-ureide ($C_3N_4H_8O_2$) and di-methylene-tri-ureide ($C_5N_6H_{12}O_3$) which is active against *Bacillus proteus* and *Pseudomonas pyocyanea in vitro*. Details are given of four cases from a clinical trial on 108 cases of septic war wounds and burns. The compound was painless on application and gave good results in cleansing sepsis and removing odour. No toxic effects were observed. This preliminary report suggests that UFI may prove effective against *B. proteus*, *Ps. pyocyanea* and *Bacterium coli* which are often left behind after penicillin and sulphonamide therapy. An ointment containing 25% UFI has proved satisfactory as an initial dressing for burns.

—T. E. GIBSON.

TØNNESEN, J. (1942.) Behandling af Følsyge med Sulfathiazol. **[Treatment of joint-ill in foals with sulphathiazole.]**—*Medlemsbl. danske Dyrlaegeforen.* p. 637. [Abst. from abst. in *Skand. VetTidskr.* **33.** 485 & 505–506.] **154**

After unsuccessful attempts to cure joint-ill with antiserum and with astibulin, T. tried sulphonamide therapy. He was unsuccessful with sulphanilamide but had good results with sulphathiazole, as is illustrated by five case records. The doses used were 5 g. followed by 3 g. after four hours and by another 3 g. eight hours after the initial dose. Thereafter 2 g. were administered three times daily up to a total of about 40 g. One case only did not respond.—J. E.

HAC, L. R., & HUBERT, A. C. (1944.) **Experimental *Clostridium welchii* infection. II. Local sulfonamide therapy (sulfadiazine, sulfathiazole and sulfanilamide).**—*J. infect. Dis.* **74.** 150–160. [For part I, see *V. B.* **14.** 251.] **155**

HAC, L. R. (1944.) **Experimental *Clostridium welchii* infection. III. Local therapy (zinc peroxide, tyrothricin, and mixtures of sulfadiazine and urea and sulfadiazine and zephiran).**—*Ibid.* 161–163. **156**

HAC, L. R. (1944.) **Experimental *Clostridium welchii* infection. IV. Penicillin therapy.**—*Ibid.* 164–172. **157**

[Authors' summaries copied *verbatim*.]

II. Local sulfonamide therapy in *Cl. welchii* infection produced by intramuscular inoculation of mice has been investigated. The drugs were administered in a suspension injected subcutaneously or intramuscularly into and near the infected area, and the amount of absorption in the blood was determined. The best survival rates were obtained with sulfadiazine (49–57%) and sulfathiazole (40–53%); sulfanilamide was of little value. A delay of 1 or 2 hours in the institution of therapy markedly reduced the protective action. The rate of survival was as good with a 1 mg. as with a 50 mg. dose, but the extent of tissue injury was greater. Low concentrations of the drugs in the blood produced by injecting the drug in the normal, uninfected leg, gave as much protection as high local concentrations produced by injecting the drug directly into the infected area. Repeated injections of the drugs protected no better than a single injection. The lesions produced at the sites of inoculation were no different than those following oral therapy, and healing seemed to be dependent upon the speed and extent of sloughing of the dead tissues. Injection of the drug 3 hours before inoculation produced results comparable to the previously reported survival rates obtained with oral therapy. They confirmed our earlier suggestion that the excellent results were due to the combined effect of prophylaxis and active therapy. These results seem to indicate that suitable sulfonamides, administered early, have a definite therapeutic effect upon *Cl. welchii* infection. They are of greatest value in prophylaxis and early treatment where they check the rapid extension of the infection and thus permit time for marshalling the defense mechanisms of the body until more adequate treatment (débridement) is possible. They are of considerable value but still leave much to be desired in the treatment of gas gangrene.

III. Zinc peroxide or tyrothricin administered locally had no protective action against *Cl. welchii* infection in mice. Mixtures of sulfadiazine and urea or sulfadiazine and zephiran were no more effective than sulfadiazine alone. The lesions resulting at the site of inoculation were as extensive as those observed in untreated animals.

IV. Local penicillin therapy in *Cl. welchii* infection produced by intramuscular infection of mice has been investigated. The results obtained in over 1,100 penicillin treated animals have been compared with those obtained in simultaneous experiments with other chemotherapeutic agents. A small series of guinea pigs confirmed the results obtained with penicillin in mice. Penicillin was of definite therapeutic value and decidedly superior to the other agents thus far investigated. The smallest dose of penicillin tried (5 Oxford units) protected as well as the largest dose of the most effective sulfonamide. Larger doses or repeated injections of small doses of penicillin protected 100% of the animals. Continued therapy gave better protection and resulted in smaller lesions at the site of inoculation than single doses of drug; e.g., 7 injections of 25 units each (total 175 units) protected 96% of the animals, while 1 injection of 500 units protected 98%. Local administration of the drug was advantageous particularly when small doses of drug were used. With larger doses, however, the drug reaching the lesions via the blood stream was equally effective. Delayed institution of therapy was less hazardous with penicillin than with sulfonamides, but the per cent survival was appreciably lowered by a delay of 3 hours. When treated animals died, the average period of survival was longer than after sulfonamide therapy. As compared with the other agents tested, penicillin was much more effective in localizing the infectious agent, in minimizing the effects of toxemia and tissue damage, and in accelerating repair. The lesions at the site of inoculation healed within 10–18 days, as compared with 22–36 days with sulfonamides. There is still need, however, for additional therapy which will prevent initial rapid invasion by the microorganism with the production of early edema and late destructive lesions. It is obvious that no chemotherapeutic agent, nor combination of agents will prove as effective alone as when combined with adequate surgical procedures.

*MARCHESANI, T. (1942.) I sali di mercurio secondo la formula Vecchi-Finzi nella cura del farcino criptococco. **[Treatment of epizootic lymphangitis with corrosive sublimate.]**—*Azione vet.* **11.** 213–215. [Abst. from abst. in *Jber. Vet.-Med.* **71.** 93.] **158**

An investigation was carried out to confirm the value of the intramuscular injection of corrosive sublimate for the treatment of epizootic lymphangitis first proposed by VECCHI-FINZI (1916). The solution used contained one part corrosive sublimate, two parts sodium chloride and 200 parts distilled water, 10 ml. being injected intramuscularly and treatment being repeated every three days with the dose being increased by 10 ml. each time up to a final dose of 60 ml. Good results were obtained in two horses treated by this method.—T. E. GIBSON.

NICOL, L., & VIRAT, B. (1944.) Sur le traitement de la lymphangite épizootique par le biiodure de mercure associé à la lutte contre les infections surajoutées. **[Treatment of epizootic lymphangitis with mercuric iodide in the control of superimposed infections.]**—*Bull. Acad. vét. Fr.* **17.** 105–110. **159**

Twelve cases of epizootic lymphangitis in the horses of a cavalry regiment were treated by various methods. Best results were obtained by preliminary treatment directed against secondary invaders followed by treatment with biniodide of mercury. Staphylococcus anatoxin given in four doses at intervals of four days was used where staphylococci were present. In one case an infection with *Corynebacterium pyogenes* persisted after *Cryptococcus farciminosus* had disappeared from the lesions. This cleared up after cauterization with a hot iron.

The biniodide of mercury was used in 0·2% solution and was given intravenously in daily doses of 50 ml. for six days. In seven cases two courses of such injections brought about complete cure. Thrombosis occurred in some cases. The authors consider that thrombosis could be prevented by using more dilute solutions.—M. C.

SAMARTSEV, A. A. (1940.) Terapiya su-auru verblyudov. **[Treatment of surra in camels.]**—*Veterinariya, Moscow.* No. 5. pp. 69–71. [French summary.] **160**

Camels with acute or chronic forms of surra were injected intravenously with naganol (Bayer 205), either alone or together with suramin or novarsenol. Lasting effects did not follow from a single dose. The best effects followed repeated doses of naganol at five-day intervals during the first fortnight after trypanosomes were discovered in the blood.

The importance is stressed of correct feeding and good husbandry in maintaining the natural protective action of the reticulo-endothelial system.—L. LEVENBOOK.

SHIRLEY, D. A. (1944.) **Derivatives of phenothiazine as chemotherapeutic agents.**—*Iowa St. Coll. J. Sci.* **19.** 53–57. [Thesis: only abst. given.] **161**

S. discusses the synthesis of a number of derivatives of phenothiazine which were prepared for testing as antimalarials. Three groups were prepared: firstly, derivatives of 10-phenylphenothiazine which contain a γ-dimethylaminopropylamino group on the 10-phenyl radical, secondly, derivatives of phenothiazine containing a dialkylaminoalkyl group in the 10-position and thirdly, a group of miscellaneous derivatives. For details of the actual compounds prepared the original article should be consulted. None of the substances prepared showed any significant action when tested against avian malaria.—T. E. GIBSON.

•VITELLO, M. (1941.) Azione del tartaro stibiato sul Plasmodium gallinaceum. **[Action of antimony tartrate on *P. gallinaceum*.]**—*R. C. Ist. Sanit. pubbl., Roma.* **4.** 360–368. [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **142.** 296.] **162**

Antimony tartrate solution introduced intravenously into hens which have been injected with blood containing *P. gallinaceum* has a slight effect on the course of the infection if the drug is given at the end of the incubation period. There is a less perceptible effect if the drug is given during the incubation period. If the fowls have been infected with sporozoites, antimony tartrate has no apparent effect on the course of the infection.—C. HORTON SMITH.

•WINKLER, A. (1942.) **[Treatment of European bovine piroplasmosis, especially in pregnancy.]**—*Inaug. Diss., Budapest.* pp. 15. [In Hungarian.] [Abst. from abst. in *Jber. Vet.-Med.* **70.** 552–553.] **163**

In W.'s practice in Hungary, cases of *Babesia bovis* infection occurred each year and during 1928–41, 249 animals were treated. Ninety-eight animals were treated with trypanblue, with one death and two emergency slaughterings, a loss of about 3%. Apart from discoloration of the flesh which made the carcasses of treated animals unusable, a considerable number of abortions occurred amongst animals which were in an advanced stage of pregnancy when treated.

Emergency slaughter was necessary in two out of 80 animals treated with "todorit", whilst out of 71 animals treated with acaprin, slaughter was necessary in only one case. No cases of abortion or premature birth occurred in the animals treated with acaprin.
—U. F. RICHARDSON.

FILIMONOV, M. N. (1940.) Khimioterapiya i profilaktika piroplazmoza ovets flavakridinom. **[Treatment of ovine piroplasmosis with acriflavine.]**—*Veterinariya, Moscow.* No. 5. pp. 67–68. [French summary.] **164**

The intravenous injection of a 1% solution of acriflavine containing 0·5 g. NaCl per 100 ml., in amounts of 0·005–0·007 mg. per kg. body weight into sheep infected with large and small piroplasms, had a pronounced preventive and curative effect on ovine piroplasmosis.—L. LEVENBOOK.

MUNRO, J. W. (1944.) **"D.D.T.": a new insecticide.**—*Nature, Lond.* **154.** 352–353. **165**

M. reviewed the conditions which were responsible for the rapid development of the use of D.D.T. as an insecticide. He considered the assumption unwarranted that D.D.T. will replace all the older insecticides, owing to the difficulty of assessing properly the relative merits of D.D.T. and its competitors until after the end of the war.—G. B. S. HEATH.

ROY, D. N., & GHOSH, S. M. (1944.) **The mechanism of action of a contact-insecticide.**—*Bull. ent. Res.* **35.** 161–170. **166**

Experiments on live insects to determine the method of entry of a contact insecticide showed that pyrethrum normally enters the body of an insect through the spiracles and that penetration through the cuticle is very slow. It is pointed out that most of the previous experiments on the penetration of insecticides through the cuticle have been carried out on dead tissue and cannot, therefore, be regarded as having been performed under natural conditions.—W. MOORE.

ANSARI, M. A. R. (1944.) **Common lice of Indian poultry and their control.**—*Indian Fmg.* **5.** 415. **167**

For control of poultry lice, the sprinkling of equal parts of sodium fluosilicate and country tobacco snuff into the feathers is suggested. For big flocks, sodium fluoride may be substituted for sodium fluosilicate, and a 1 : 80 solution in water used as a dip.—M. A. KHAN.

BUSHLAND, R. C., MCALISTER, L. C., Jr., EDDY, G. W., JONES, H. A., & KNIPLING, E. F. (1944.) **Development of a powder treatment for the control of lice attacking man.**—*J. Parasit.* **30.** 377–387. **168**

Laboratory methods for the evaluation of insecticides for body louse control and the development of an effective louse powder are described.

The louse powder, the MYL formula of the U.S. Armed Forces, consists of 0·2% pyrethrins as a toxicant, 2·0% IN-930 as a synergist, 0·25% phenol S as an anti-oxidant and 2·0% of 2,4-dinitroanisole as an ovicide, with pyrophyllite as an inert diluent.

The inclusion of 2·0% IN-930 (*N*-isobutylundecylenamide) increased the toxicity of the pyrethrins to body lice by approximately 100 times.

In tests with phenol S (which consists essentially of isopropyl cresols obtained as a by-product of thymol manufacture) added to pyrethrum powder as an anti-oxidant, it was found that such pyrethrum powder spread in a thin layer and exposed freely to the air for six months, remained as effective as freshly prepared powder.—W. MOORE.

HANSENS, E. J. (1944.) **Humidity in relation to the ovicidal effect of powders used against the body louse.**—*J. econ. Ent.* **37.** 750–755. **169**

Tests on a number of ovicidal powders showed that 10% tertiary butyl valone was the only material effective at all humidities. Several other powders were effective at humidities of 65% and above, but the rise in effectiveness was not the same with all materials. It is suggested that humidity may be an important factor in the effectiveness of other insecticides, particularly powders, against various insects and their eggs.—W. MOORE.

CRAGG, J. B. (1945.) **"D.D.T." as a sheep blowfly dip. [Correspondence.]**—*Nature, Lond.* **155.** 394. **170**

Of 215 sheep dipped in a D.D.T. emulsion, three were fly-struck during the 44 days covered by the experiment. Twenty-one strikes occurred during this period in an untreated group of 215 similar sheep grazing the same pasture. In the treated group, the first strike occurred six days after dipping, by which time 13 strikes had been recorded on the controls. Five weeks after dipping, toxic symptoms were induced in gravid females of *Lucilia sericata* by 30 seconds' contact with the treated fleece. By the use of artificial attractants, it was generally possible to induce oviposition on undipped sheep or even on sheep dipped two days previously in a proprietary arsenic dip, but in no case was oviposition brought about on a D.D.T.-dipped sheep, even 44 days after dipping.—G. B. S. HEATH.

STEWART, M. A. (1944.) **Rotenone and ox warble control.**—*J. econ. Ent.* **37.** 756–760. **171**

Warble-fly infestations can be controlled by spraying under a pressure of 250–300 lb., from a nozzle delivering a flat, fan-shaped spray against the grain of

the hair, a mixture containing 10 lb. derris, 10 lb. wettable sulphur and 1 pint detergent in 100 gal. For hand treatment with a brush, at least 12 oz. derris per gal. water must be used to obtain control, while dusting with a mixture of equal parts of sulphur and derris is effective only against fifth-stage larvae.

Lethane 384, Lethane 60, ethylene dichloride, trichloroethylether, dichloroethylether, 2,4-tertiary [butylphenoxy ethanol], Thanite and D.D.T. were found to be ineffective against warble flies.—W. MOORE.

SIMMONS, S. W., & DOVE, W. E. (1945.) **Experimental use of gas condensate for the prevention of fly breeding.**—*J. econ. Ent.* **38.** 23–25. **172**

The light fraction of gas condensate, obtained as a by-product from the carbonization of coal, was found to be very effective in destroying the immature stages of muscid flies. It is suggested that spraying the breeding places with this fraction, or a mixture of equal parts of it and no. 2 fuel oil, will form a cheap method of control of these pests.—W. MOORE.

GINSBURG, J. M. (1944.) **Mosquito oils, larvicides, repellents, outdoor sprays and their application.**—*Bull. N.J. agric. Exp. Sta.* No. 711. pp. 12. **173**

A review is given of the chemical method of controlling mosquitoes, together with notes on available larvicides and spraying equipment.

A spray developed in New Jersey, which has given satisfactory results over a period of years, contains 66% kerosene, 0·07% pyrethrins, 0·5% sodium lauryl sulphate and 33·5% water. For use, one part of this concentrated stock emulsion is mixed with 10 parts of water. While this emulsion is very toxic to mosquito larvae, it is harmless to plants, fish, waterfowl, man and other higher animals and offers no fire hazard.—W. M.

ROBINSON, G. G. (1944.) **Testing insecticides on the argasid tick,** *Ornithodorus moubata*; **Murray.**—*Bull. ent. Res.* **35.** 95–99. **174**

Sprays and dusts containing pyrethrum were outstanding in their high toxicity to *O. moubata* and are recommended for use in control. A valuable list is given of a large number of substances tested for toxicity and found to be inert or of little value.—W. MOORE.

BADANIN, N. V., & VIL'YAMS, V. V. (1943.) Konskie fekalii—syr'evaya baza dlya protivochesotochnovo sredstva. [**Horse faeces as raw material for mange remedies**].—*Veterinariya, Moscow.* No. 1. pp. 23–[illegible] **175**

The acute shortage of all pharmaceutical preparations caused by the war led the authors to examine the therapeutic possibilities of raw materials available locally. Sheep faeces have been used traditionally in the Middle East as a folk-lore remedy in mange and as a disinfectant. Sheep faeces not being available in sufficient quantities, experiments were made with horse faeces.

For comparison, 1 kg. of sheep faeces and 1 kg. of horse faeces were dry-distilled in a primitive apparatus on an open fire. The moisture content of the sheep faeces was 64·67% and of the horse faeces 72·13%. The resultant liquors smelt strongly of phenol; the solid content of liquor from sheep faeces was 6·7% and from horse faeces 7·67%. The solid base had an ointment-like consistency, was almost black in colour and smelt tarry. Chemical analysis yielded phenols of the same consistency smelling strongly of cresol and xylenol. After the elimination of phenols, the residue had a typical smell of indole and pyridine bases. Lassen's test proved the presence of nitrogenous substances. The ointment-like mass was fractionally distilled. Horse faeces had a higher content of phenols and a lower content of resinous substances than sheep faeces.

In the experimental treatment of mature mange mites, only a slight difference could be observed between the effectiveness of fractional distillates of sheep and horse faeces.

Treatment of mites *in vitro* with distillate from horse faeces gave the following results. On freshly impregnated gauze the mites died in 8–12 min.; on gauze impregnated an hour previously they died in 21–22 min., on gauze impregnated two hours previously they died in 30–35 min. and on gauze impregnated three hours previously, they remained alive for 24 hours.

Equine psoroptic mange was successfully treated with the ointment-like mass obtained from sheep and horse faeces, locally called "kara-yak". Complete recovery was obtained by three applications, with an interval of ten days between the first and second application and of three days between the second and third.

In local treatment of mange, "kara-yak" has acaricidal and therapeutic value; in its therapeutic properties it is very much like Stockholm tar to which it is also akin in chemical composition.—E. CHERKESI.

*KRAHWINKEL, R. (1942.) Die Behandlung der Räude mit Natriumthiosulfat und Salzsäure. [**Treatment of mange in cattle with sodium thiosulphate and hydrochloric acid**].—*Inaug. Diss., Hanover.* [Abst. from abst. in *Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 255.] **176**

Sixty housed cattle, slightly or severely affected with mange, were employed in the investigation recorded. Separate applications of 60% sodium thiosulphate solution and 10% HCl were made, the HCl being applied before the thiosulphate solution had dried; the interaction of the two substances on the skin causes the liberation of sulphur dioxide. In light or medium infestations, two applications at an interval of 3–10 days are sufficient, whilst in severe and generalized infestations three treatments are given, the skin being thoroughly washed with soft soap and water two days before each treatment. No toxic symptoms, such as swelling or irritation, were observed in any of the treated animals. Good results are claimed.—T. E. G.

*DELAK, M. [**Anthelmintic action of tetrachlorethylene and tetrachlormethane.**]—*Vet. Arhiv.* **13.** 9. [Abst. from abst. in *Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 254.] **177**

In vitro experiments using horse ascarids showed that 0·001% solutions of tetrachlormethane and tetrachlorethylene were toxic to the nematodes after long exposure. Tetrachlormethane in 0·01% concentration killed the ascarids in 23 hours, whilst tetrachlorethylene in similar strength took 25 hours. Both drugs cause initial excitation of the worms followed by paralysis and, if the action of the drug continues, death. Kymograph records show that both drugs cause an increase in tonus corresponding to the concentration of the solution. Both drugs cause death by inducing paralysis.—T. E. GIBSON.

GUILHON, J., & PRIOUZEAU, M. (1944.) Essais de traitement des parasitoses du tube digestif des équidés et des bovidés par la thiodiphénylamine. [**The treatment of parasitism of the alimentary tract of equine and bovine animals with phenothiazine.**]—*Bull. Acad. vét. Fr.* **17.** 202–217. **178**

The authors discuss the factors which result in outbreaks of helminthiasis in horses and cattle and give a summary of the results obtained in the treatment of 274 animals with phenothiazine. In a dose of 50 mg. per kg. body weight per day for two consecutive days, phenothiazine was effective against light and medium

infections of coccidiosis, trichostrongylosis and ascariasis [*Neoascaris vitulorum*] in young cattle and against strongylosis and ascariasis in equines. In heavy infestations or in mixed infestations, a dose of 200 mg. per kg. body weight was given on two consecutive days. The use of larger doses did not result in a better anthelmintic effect and often resulted in constipation. After phenothiazine treatment improvement in condition took place rapidly. Pregnant females and brood mares were treated without the untoward effects which frequently follow the administration of other anthelmintic drugs to these animals. The authors conclude that phenothiazine is superior to other drugs previously employed for gastro-intestinal parasitism in bovines and equines and suggest that it should be used periodically as a prophylactic.—T. E. GIBSON.

SISK, B. H. (1945.) **Vitamin A in the treatment of acetonemia.**—*Vet. Med.* **40.** 281. **179**

It is claimed that treatment of acetonaemia in dairy cows with vitamin A alone or in conjunction with glucose has given better results than treatment with glucose only. Two case reports are given in which 250,000 I.U. of vitamin A were given followed by a similar dose 10–12 hours later. Recovery was complete after about 24 hours.—R. ALLCROFT.

SCHELLHASE. (1944.) Sulfoliquid (Sl.) oder Lebertran? [**"Sulfoliquid" or cod liver oil in wound treatment.**]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* Feb. 18th. 62. **180**

S. treated two cases with these substances. He concludes that "sulfoliquid" is much better for wound healing than is cod liver oil.—J. M. ROBSON.

HOOGERHEIDE, J. C. (1945.) **The germicidal properties of certain quaternary ammonium salts with special reference to cetyl-trimethyl-ammonium bromide.**—*J. Bact.* **49.** 277–289. **181**

A large number of quaternary ammonium salts have bactericidal properties. In a study of these salts derived from aliphatic or heterocylic amines it was found that optimum bactericidal activity was present in compounds possessing one cetyl [$C_{16}H_{33}$–] radical and three simple radicals such as three methyl groups, as in the case of cetyl-trimethyl-ammonium bromide. The antiseptic properties of five other substances in the homologous series where the cetyl group was replaced respectively by other groups such as [C_8H_{17}–], [$C_{10}H_{21}$–], etc., were also investigated. Rapid sterilization was observed with C_{16}TAB in concentrations as low as 1 : 80,000 and growth of *Staphylococcus aureus* was prevented when the dilution was 2·5–3 μg. per ml.

The effect was studied of the influence of pH and of temperature on the activity of this compound. It was found that solutions with pH 8·0 could be diluted considerably more than those with pH 5·0 and still exhibit germicidal potency, and the time required for complete sterilization was shorter at higher pH for all concentrations used. The activity of the substance was inhibited in the presence of serum, and milk also reduced the effectiveness. By comparison of its potency with commonly used disinfectants it was found that this compound was one of the outstanding bactericidal and bacteriostatic agents.—E. M. J.

See also absts. **2** (treatment of ocular streptococcus infection), **17** (of erysipeloid), **94** (action of chloropierin on helminths), **96** (anthelmintic mixture for sheep), **102** (antibody treatment of lymphosarcoma), **147** (D.D.T. toxicity), **205** (phenothiazine-salt mixtures for horses).

HYGIENE, PUBLIC HEALTH AND VETERINARY SERVICES

MORRIS, C. S., & EDWARDS, M. (1944.) **Effect of high cell content on resazurin and methylene blue tests.**—*Dairy Indust.* **9.** 92. [Abst. in *J. Dairy Sci.* **27.** No. 12. A185, copied *verbatim.*] **182**

It was found that the inclusion of high-cell-content milk into good quality bulk milk did not materially affect the results of the "Ten-Minute" Resazurin Test. However, in some cases when such milk was subjected to the Standard Routine Resazurin Test, a definite effect was noted so that the milk might be placed in the B or C categories. In some cases the addition of 5 per cent of high-cell-count milk to good quality, low-cell-count milk was sufficient to cause a noticeable change in the test. The Methylene Blue Test was also found to be affected by the presence of high cell content milk in otherwise good quality milk. As little as 15 per cent of high-cell-count milk (from cows with no clinical symptoms of mastitis) can be sufficient for a failure on the Methylene Blue Test.

In some cases high-cell-count milk has the same resazurin reduction time as milk of normal cell content. In the majority of these cases, the cells present were mainly tissue cells. The author points out that this work is only preliminary and in many ways incomplete.

THOMAS, S. B., & BOWIE, D. A. (1944.) **Influence of udder cells on the routine resazurin test, the ten-minute resazurin test and the methylene blue test.**—*Dairy Indust.* **9.** 335. [Abst. in *J. Dairy Sci.* **27.** No. 12. A185–A186, copied *verbatim.*] **183**

Approximately 5,000 bulk herd samples were examined over a period of three years. Seventy per cent of the samples had cellular counts under 750,000 per ml., while 20 per cent had counts between 750,000 and 1,500,000. Eight per cent of the samples contained over 1,500,000 cells per ml.

Normal milk from herds with a low incidence of mastitis and counts under 750,000 cells per ml. were not degraded to categories B and C in the routine resazurin classification. Leucocyte activity alone was found responsible for the degradation to category B of 25 per cent of the samples with cell counts between 750,000 and 1,500,000. Milk infected with mastitis or containing a high proportion of late lactation milk was usually detected by the routine resazurin test. Sixty-five per cent of the samples containing over 1,500,000 cells per ml. were degraded to category B and 10 per cent to category C. Twenty-five per cent of these samples reduced methylene blue within 5½ hours.

PALLASKE, G. (1943.) Zur Frage der sog. frischen Blutinfektion und der fleischhygienischen Bedeutung der Tuberkulose mit grosser Ausdehnung. [**The criteria for meat inspection in generalized TB.**]—*Z. Fleisch- u. Milchhyg.* **53.** 161–163. **184**

P. discusses further the new regulations for meat inspection, introduced in Germany in 1940 [see *V. B.* **15.** 376, abst. 2277]. As the reaction of the cells to infection with *Mycobacterium tuberculosis* is visible microscopically in 1–2 days and macroscopically in 8–14 days it is possible for an infected animal to be slaughtered before visible tuberculous lesions have developed. An improved meat inspection service is required.—N. C.

JENSEN, L. B. (1944.) **Prevention of bacterial food poisoning by food preservation methods.**—*J. Amer. vet. med. Ass.* **104.** 63–65. **185**

J. discusses in general terms the prevention of food poisoning in man, emphasizing the danger of leaving foodstuffs at incubation temperature for any considerable period and of allowing food handlers with infective conditions, either cutaneous or liable to be spread by

droplet infection, to come into contact with animal foodstuffs.—H. Paver.

Getting, V. A., Rubenstein, A. D., & Foley, G. E. (1944.) **Staphylococcus and streptococcus carriers. Sources of food-borne outbreaks in war industry.**—*Amer. J. publ. Hlth.* **34.** 833–840. **186**

Staphylococci are considered to be the most common cause of food poisoning in the U.S.A.

Staphylococci and streptococci present in the nose and throat of food operatives were apparently identical with organisms isolated from contaminated food in 13 of 18 of the outbreaks reviewed.

The incidence of food poisoning is likely to increase as a result of the greater number of people taking their meals in restaurants and cafeterias. It has been found that in factories engaged on war work, outbreaks of food poisoning have become a notable cause of absenteeism among the workers. The lack of personnel trained in the hygienic handling of food, the increased work demanded of the staff and the lack of proper equipment are the principal causes for the increase in these outbreaks.—H. E. Bywater.

Polding, J. B. (1944.) **Mechanization of Indian veterinary services.**—*Indian Fmg.* **5.** 304–305. **187**

In anticipation of the post-war release of veterinarians and automobiles and the construction of better motor-roads, P. suggests that here is an opportunity to mechanize the veterinary services. This would facilitate efficiency and promptitude in the diagnosis, prevention and cure of infectious diseases and in the administration of livestock improvement plans. With the present crude forms of transport, difficulties and delays are inevitable.—G. L. Sharma.

Ahmad, S. D. (1944.) **Activities of civil veterinary departments in British India.**—*Indian vet. J.* **21.** 149–154. **188**

The main functions of the veterinary departments in India comprise the adoption of preventive and therapeutic measures against animal diseases, castration of "scrub" animals, animal husbandry work, and research. A brief account is given of the Imperial Veterinary Research Institute and of the five colleges in India. Stress is laid on the necessity for establishing more quarantine stations; at present there are only two of these.—S. W. H. Rizvi.

See also absts. **9** (TB. and meat value), **12, 13** (bovine TB. in man), **84** (bovine cysticercosis of oesophagus), **85** (echinococcosis control), **89–92** (trichinosis).

TECHNIQUE AND APPARATUS

Lande, F., & Dixon, R. F. (1944.) **A comparative study of guinea pig inoculation and cultures for the demonstration of tubercle bacilli.**—*Amer. J. clin. Path.* **14.** No. 9. Tech. Sect. 93–97. [Authors' summary copied *verbatim*.] **189**

Results of cultures for tubercle bacilli, using Petragnani's medium and animal inoculation of 155 miscellaneous specimens have been given. Agreement of the two methods was obtained in 140 specimens, 90·3 per cent. 25 specimens, 16·1 per cent, gave positive cultures. 24 specimens, 15·4 per cent, were found positive by guinea pig inoculation. The combination of the two methods yielded positives on 29 specimens, 18·7 per cent.

Hobbs, B. C., King, G. J. G., & Allison, V. D. (1945.) **Studies on the isolation of Bact. typhosum and Bact. paratyphosum B. II. Comparison of the selective value of four modifications of Wilson and Blair's bismuth sulphite agar including a new powder.**—*Mon. Bull. Min. Hlth Emerg. publ. Hlth Lab. Serv.* **4.** 40–46. [Authors' summary and conclusions copied *verbatim*.] **190**

Comparisons made between Difco bismuth sulphite powder and de Loureiro and Tabet modifications of Wilson and Blair's bismuth sulphite agar for the isolation of *Bact. typhosum* and *Bact. paratyphosum B.* showed that there was little difference in the selectivity of the three media; de Loureiro's modification, however, showed a slight superiority over the other two.

Small adjustments were made to each of the three modifications in order that easily recognizable black colonies of *Bact. typhosum* would grow in 18–24 hours.

A powder "K" is described, similar to the Difco product but without the nutrient agar ingredients. A weighed amount is added to a measured volume of melted nutrient agar and poured into plates. The results obtained with this powder compared favourably with those given by de Loureiro's modification for the growth of both *Bact. typhosum* and *Bact. paratyphosum B.* and appeared to be superior to the results obtained with Difco and Tabet agars.

"K" powder is a stable product and is as simple to prepare for use as Difco agar; therefore it possesses advantages over the methods of Tabet and de Loureiro which depend on stock solutions of ingredients which do not keep indefinitely.

Krause, A. (1943.) Beitrag zur Aufbewahrung trichinösen Fleisches für Lehrzwecke. **[Preservation of specimens of trichinosed flesh for teaching purposes.]**—*Z. Fleisch- u. Milchhyg.* **53.** 214–215. **191**

The following method is described for the preservation of trichinosed flesh for use in meat-inspection classes. Twenty-four hours after slaughter the piece of infested flesh is removed from the body, the size being determined by the size of container available. The piece of muscle is suspended by a thread in a vessel containing a 4% solution of sodium benzoate, care being taken that it does not touch the side of the vessel at any point. The solution is changed after 24 hours and again after 48 hours and the piece of muscle may then be stored in the solution for long periods. The solution must be changed every three months, the vessel being carefully cleaned before refilling. When preserved in this way the tissue does not change colour or consistency, samples seven months old showing only an insignificant fading of colour. The microscopic picture of the trichinae in compressorium preparations remains unchanged.—T. E. Gibson.

Gould, S. E. (1944.) **A new type of trichinoscope.**—*Amer. J. clin. Path.* **14.** No. 9. Tech. Sect. 98–100. **192**

G. describes a compressorium which he has devised for microscopic examination of muscle for the presence of *Trichinella* larvae. It consists of two thick circular glass plates which fit inside flat, round metal frames; these can be clamped together by means of two bolts which are attached to the lower metal frame and pass through holes in the upper metal frame. Wing screws on the ends of the bolts fasten the whole apparatus together. The top surface of the lower glass disc is ruled into squares by means of sharp, fine, parallel lines 1·1 cm. apart made by a diamond scribe. In use, the muscle specimen to be examined is placed between the two glass discs, the apparatus is assembled and the specimen is compressed by tightening the finger screws on the bolts. Advantages claimed by G. for his device

over other compressoria are the ease of manufacture, inexpensiveness, ruggedness of structure and uniform distribution of the compressing force. Measurements and specifications are given.—J. N. OLDHAM.

WEBB, H. B., IRISH, O. J., & LYDAY, V. I. (1944.) **Effect of Seitz filtration upon pH.**—*J. Bact.* **48.** 429–437. **193**

Various washing fluids drawn through Seitz filter pads tended to become more alkaline in reaction, though this increase in alkalinity was not proved to be due to the specific effect of Mg compounds present in the filters. The electrometric titration curves of the filtrates and pads suggested the presence of either a weak base or a buffer substance with a basic pH. The authors recommend a more thorough and efficient processing of the pads before they are sold, and suggest that standards of processing be laid down to ensure the manufacture of pads more nearly neutral in reaction. —A. EDEN.

CUTLER, J. W. (1943.) **Standardization of sedimentation rate.**—*Amer. Rev. Tuberc.* **48.** 314–323. [Spanish summary.] **194**

In this paper the important factors known to have a determining influence on erythrocyte sedimentation rates are discussed; the basic principles involved and a new technique are also described.

Red cells do not settle as separate cells but as closely linked aggregates or rouleaux of specific size. There are three phases to the sedimentation phenomenon, rouleaux formation, settling and packing, and these have been studied by means of multiple readings at 5-min. intervals and graphs have been made.

The new method, based on the fact that it is the size of the rouleaux which determines the rapidity of the settling, estimates the sedimentation rate at a time when the rouleaux are formed and settling at maximum velocity. Details are given using Cutler sedimentation tubes. A maximum settling in any 5 min. of 1 mm. or less is normal, and anything more is pathological. C. considers that there is justification for standardization based on this technique.—E. M. J.

VÖLKER, R., & BARKE, A. (1943.) Periston als Blutflüssigkeitsersatz für den Hund. [**Use of periston for blood transfusion in the dog.**]—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 261–263. **195**

The injection of periston [a blood colloid, polyvinylpyrrolidon] into healthy dogs at the rate of 2–3 ml. per kg. body weight produces fright, irritation and increased respiration. Large doses produce urination, defaecation and even vomiting.

Anaesthetized dogs, which have lost much blood, take large doses without effect, but narcosis is prolonged. In normal animals, large doses produce a fall in blood pressure, but this does not occur if several small doses are given.—A. T. PHILLIPSON.

I. KAPRALOV, A. A. (1939.) Mitogeneticheskie luchi i vozmozhnosti ikh primeneniya v veterinarii. [**Mitogenetic radiation and its use in veterinary practice.**]—*Sovyet. Vet.* No. 12. pp. 50–53. **196**

II. ZALKIND, S. Y., & BESKHLEBNOV, A. V. (1941.) Mitogeneticheskoe izluchenie krovi pri beremennosti u loshadei. [**Mitogenetic radiation of the blood of mares during pregnancy.**]—*Veterinariya, Moscow.* No. 1. pp. 100–104. [French summary.] **197**

I. K. discusses this phenomenon and reviews its application in medicine. The mitogenetic radiation referred to, which originally was described by GUREVICH in 1923, is based on the fact that various chemical processes in tissues, such as proteolysis and glycolysis, produce short-wave ultra-violet rays which induce cell mitosis. In clinical examinations Gurevich and his co-workers used, as "detectors" of the rays, yeast cultures which were exposed in special containers to radiations from blood, the presence and intensity of radiation being judged by an increase of daughter cells in exposed smears in comparison with the unexposed controls. In unexposed cultures the increase of daughter cells averaged 30–35%, and in radiated cells 30–50% and up to 80%.

Using Gurevich's technique, which is described in detail, K. examined the blood of six normal horses, of nine affected with acute alveolar emphysema, of one with triscupid insufficiency, and of one with flatulent colic. It was found that in horses affected with emphysema the blood radiation disappeared; in the horse with colic the radiation was below normal and in the horse with cardiac dysfunction it remained normal.

K. suggests that this phenomenon may be of importance in the clinical examination of animals.

II. The authors applied the phenomenon of the mitogenetic radiation of the blood as described by LINTAREVA (1937) and worked out in human beings, for early pregnancy diagnosis in mares. They claim that in pregnant mares the intensity of mitogenetic radiation is greatly increased and that the period of exposure for the demonstration of the phenomenon is 5–15 sec. in pregnant mares, whereas in non-pregnant mares it is 3–5 min. The phenomenon could be demonstrated 15–18 days after fertilization. Two or three days after foaling, the increased radiation returned to normal. In two mares, during oestrus, the time required for the demonstration of the phenomenon was 90 and 30 sec. respectively.—A. MOLDAWSKY.

See also abstr. **7**, **8** (TB. diagnosis), **16** (mallein test), **20** (preservation of pullorum antigen), **31** (preservation of plasmodia by freezing), **128** (cannulae for draining gastrotomies and Pavlov fistulae), **136** (assessment of male fertility), **137** (preservation of sperm), **205** (preparation of swine fever vaccine).

MISCELLANEOUS

*BRANDT, K. (1944.) **The prospective requirements for dairy cattle replacements in Europe as a result of the war.**—*Bull. int. Ass. Milk Dlrs.* **36.** No. 15. 199–204. [Abst. in *J. Dairy Sci.* **28.** No. 1. A9–A10, copied *verbatim*.] **198**

The author's estimate is that in the summer of 1944 the European dairy herd was probably less than 10 per cent below the prewar level. Although there will need to be some replacement of dairy stock after the war, it is the opinion of this writer that such replacement requirements will be met almost exclusively with European stock and that shipments of breeding stock from the United States will not occur in substantial volume, if at all. Among the reasons for the above conclusions are:

1. Since the main reduction of herds in Europe has been due to lack of imported concentrates, an increase in these supplies will result in rapid build-up of herds, with perhaps prewar numbers reached in 2 or 3 years.

2. Many of the breeds of dairy cattle needed in Europe are not to be found in the United States.

3. Farmer organizations in the various dairy cow deficient countries will want to keep the profitable replacement business for their own people.

4. Good dairy cattle are not readily transported

without considerable injury, especially during a long, rough sea voyage.

5. American dairy cattle today are probably the highest-priced cattle in the world.

It is suggested that a practical substitute for cattle importation into Europe would be the sending of grain and oil seeds to these countries. In this way they could quickly replenish their own herds. In the meantime, the United States could continue shipping milk products to Europe as long as needed.

TOWNSEND, C. H. S. (1945.) **A method of numbering and marking army animals adopted in the Central Mediterranean Forces.**—*J. R. Army vet. Cps.* **16.** 141–147. **199**

The method used was an adaptation of that used in the U.S. Army for about 20 years and has many advantages over the hoof branding practised by the British army. The "irons" used had a branding area of about 2½ inches in height, 2½ inches in width and ⅛ inch width of line.

In the Central Mediterranean Forces the mark consisted of a broad arrow followed by a composition of a single letter and three figures. By placing the letter in various positions it was possible to get 4,000 combinations with each letter (*e.g.*, B081, 0B81, 08B1, etc.). A separate letter was given to each remount depot where records were kept of the animal's description. The brands were placed on the off side of the neck, parallel to and 1 inch below the edge of the mane. The U.S. Army place their brands on the near side of the neck. To avoid sloughing of the skin a space of ½ inch is filed out of the lines where the lines cross. Only letters easily distinguishable are used, such as T, X, V, H, etc. Letters such as B and C may be mistaken for 8 and 0 respectively.

In carrying out the operation the part is clipped, the irons must be red hot (heating on a charcoal fire is recommended to prolong the wear of the irons) and a space between numerals of 1½ to 2 inches is necessary to make reading easy.

After branding a dressing of Stockholm tar and vaseline or other fly repellent is applied.

Three plates illustrate clearly the method and the ize of branding figures used.—J. A. GRIFFITHS.

STEEVENSON, G. F. (1945.) **The collection of animals for slaughter in India.**—*J. R. Army vet. Cps.* **16.** 157–159. **200**

This short paper describes the organization for collection and preparation of livestock for slaughter purposes for the Armed Forces in India. There were restrictions on the purchase of animals having an economic value for other purposes. Very few female sheep and goats were purchased.

Special preventive measures were necessary to reduce losses from rinderpest, F. & M. disease and haemorrhagic septicaemia. Open pens for cattle were allowed with approximately 14,400 square feet of floor space per 100 head of cattle.

Cattle intended for export were kept ten days after inoculation with rinderpest goat virus. Breakdowns to tick-borne infections among indigenous cattle occurred frequently during wet weather and when they were driven long distances.

Among sheep and goats, pleuro-pneumonia of goats, intestinal helminth infestation, and rinderpest, which spread rapidly and caused very high mortality in animals in collecting centres, were the main causes of losses. These animals did not do well if they were kept confined in pens. 200 animals were allowed 4,000 square feet of floor space. Goats and sheep must be kept in separate pens. [The observation that rinderpest is endemic in sheep and goats and causes high mortality in collecting centres is of special interest.]——J. A. GRIFFITHS.

I. FROEHNER, R. (1944.) Woher kommt das Wort Veterinär ? **[Derivation of the word "veterinary".]** —*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **52/50.** 149–150. **201**

II. LECLAINCHE, E. (1944.) Vétérinaire.—L'origine et l'histoire d'un mot. **[The origin and history of the word "veterinary".]**—*Bull. Acad. vét. Fr.* **17.** 194–201. **202**

I. The word "veterinary" derives from Latin *veterinarius* from *veterinus* which PLINY and other writers use to denote the horse and donkey as opposed to sheep and cattle. F. rejects the theory that *veterinus* comes from **venterinus*, or from *vehere*, to carry. He gives its root as **vet-* from which derive Latin *veter*, meaning old, *vitulus*, a year-old calf, Gothic *withrus*, a year-old sheep, Celtic *vessis*, a year-old pig, and so on. *Veterinarius* is used by Latin writers to denote one who looks after the "*veterinae bestiae*", a cowherd. The oldest Munich *Stadtbuch* defines *veterinarius* as one "*der saumthyr treybt*".

II. This article reproduces many of the illustrations and observations of I and emphasizes the non-medical sense of the word "veterinary". The term "veterinary surgeon" is more strictly correct than "veterinarian". Latin writers speak of "*medicus veterinarius*", "*medicus pecuarius*", etc. The Roman camp included a veterinary hospital with practitioners known as "*mulomedici*".

With the disappearance of the Romans from France the term *maréchal* became used for one practising veterinary medicine. *Vétérinaire* returned under the influence of the Renaissance; *Kurschmied* was used in Germany until the word *Tierarzt* became popularized in the 16th century. In England the word "veterinary" appears to have been first used by Thomas Browne in 1643.—S. M. G.

KAZANSKIĬ, I. I. (1941.) Voprosy planirovaniya i rukovodstva nauchnoĭ rabotoĭ. **[Discussion of the co-ordination and direction of scientific research in the U.S.S.R.]**—*Veterinariya, Moscow.* No. 2. pp. 140–143. **203**

K. reviews the research organization of the All-Union Institute for Experimental Veterinary Medicine, which comprised five research institutes and 29 experiment stations. In 1940, the organization was extended by the addition of the Lwow research institute, the Novosibirsk and Kirghiz experiment stations, and two stations in Kazak S.S.R., attached to the Alma-Ata research institute.

K. critically reviews the work of some of the research stations. Work was done at the Bashkir station on bacteriophage, at the Rostov and Ordzhonikidze stations on bovine infectious jaundice [*Leptospira icterohaemoglobinuriae* infection]; at the Leningrad, Ukrainian and Alma-Ata institutes on brucellosis; at the Uzbek station on theileriasis; at the Kazan institute and Bashkir station on equine encephalomyelitis; at the Salekhard and Izhma-Pechorsk laboratories on reindeer diseases, and at the Omsk institute on disinfection of wool and hides, etc.

Among the causes hindering efficiency are stated to be incoordination and the alteration by local institutions of plans made by the central organization. Older institutes, K. suggests, should be left to work more or less independently, while younger institutes should strictly follow the plans of the central organization.

Among subjects recommended for investigation during the next year were: equine infectious anaemia, investigation on diagnosis; equine encephalomyelitis,

natural infection, studies on different virus strains, different types of vaccine; foot and mouth disease, investigation of typing of viruses and preparation of vaccines; the diseases of young stock, and infectious jaundice.

In order to co-ordinate research work and clinical practice, K. recommends combined investigations in each province on the incidence and control of diseases.
—A. MOLDAWSKY.

GREAT BRITAIN. (1943.) **The Leverhulme Trust. The West Africa Commission 1938-1939. Technical reports.** pp. 86. London: The Trustees. 4to. Items of veterinary interest, pp. 34–36 & 59–81. **204**

Part I of this report which deals with crop production and soil fertility problems, although perhaps of more specific interest to agriculturists, contains much of general interest to the colonial veterinarian. On pages 34–36 the subject of mixed farming with its benefits is briefly discussed, with the conclusion that its general application is unlikely to be successful owing to difficulties of climate, disease and the tsetse fly. [Many colonial veterinary officers would disagree with this.]

Part II (DOHERTY, A. G.) reports on livestock problems.

Chapter I describes local conditions of animal husbandry, wastage from disease, water and pasture problems etc. Chapter II deals with indigenous livestock and points out that, although West Africa is usually discussed in terms of its agricultural products, its great potential output of livestock and their products has not so far been generally recognized. In the past, hides and skins formed the major export of animal produce, some skins in particular, *e.g.*, "Sokota Reds", having an international reputation for quality. Chapter III considers the conditions under which cattle are kept and bred and their possible improvement. The potentials of the great fertile stretches and fine pasture lands of Northern Nigeria and the French territory between Nigeria and the Sudan, common grazing grounds for Fulani stock-owners, are stressed; the utilization of these potentially rich livestock areas depends upon the control of disease, the provision of water supplies and the improvement of the productivity of the pastures; when these have been accomplished, breed improvement by selection will become possible.

The discussion which follows on conditions in Nigeria alone includes an enlightened plea for the recognition of the value of the goat, particularly of its position in small holdings and the difficulty of finding a suitable substitute in the family menage. The goats are the property of the women of the house and play a prominent part in ceremonial usage. Their prolificacy, their milk and the quality of their flesh are greatly appreciated by the villagers. The menace of the goat to agriculture seems to have been greatly exaggerated; African cultivators do not permit their goats to damage food crops and tether them during the growing season. Chapter IV describes the systems of marketing and distribution in vogue as "admittedly inefficient and extremely wasteful". The improvement of stock routes and provision of means of transport of dressed carcasses are recommended to reduce the wastage. [A more recent report from Nigeria (1942) records a great improvement in rail transport during the war.]

According to the official census, the cattle population in Nigeria is only just over three millions but from figures available as to meat consumption and export of hides it appears to be more in the region of five and a half millions, a fine potential if present avoidable wastage can be reduced and distribution organized. Improvement in the marketing of hides and skins in native Africa has not kept pace with improved methods of preparation; it is felt that traders do not generally encourage the improved methods of preparation demonstrated by the Veterinary Department for many years.

The sociological aspect of RINDERPEST is dealt with on p. 76. Heavy loss of stock is calamitous in an African community and Government action which is effective in its prevention is well calculated to gain the confidence of peoples otherwise indifferent. It is claimed that the veterinary services have established this confidence in parts of Nigeria and the Gold Coast.

Chapter VI constitutes a plea for a joint effort by all governments concerned to eradicate the two major cattle-limiting diseases in Africa, RINDERPEST and BOVINE CONTAGIOUS PLEURO-PNEUMONIA, as a necessary preliminary to development of the huge animal potential in equatorial Africa. During recent years conferences on the question of rinderpest control have been held jointly by the administration of different territories under British control in which representatives of French and Belgian administrations in Africa have joined, and the necessity of joint action has been stressed. A centrally placed laboratory for the manufacture of biological products would go a long way to solve the outstanding problem of economic production.

Chapter VII gives notes on game preservation in the West African dependencies suggesting that game preservation should be confined to large unfarmed areas and abandoned in the rest of the country where rare species can be protected by a revival of the old tribal hunting laws and a system of regional licences. Game in Nigeria under present conditions do not justify adoption of orthodox and expensive game preservation measures as a business proposition.

[Much that has been written in this report with regard to the livestock potential and its future development in West Africa applies almost equally well to the East African dependencies which, if included in any development scheme, would raise the very conservative estimate of 10 million cattle to an even more conservative estimate of some 20 millions at present supplying a mere fraction of their utilitarian capacity for the benefit of both man and the soil, even within their own boundaries.]—S. A. EVANS.

REPORTS

U.S.A. (1944.) **Report of the Chief of the Bureau of Animal Industry, Agricultural Research Administration, 1944.** [MILLER, A. W.] pp. 48. Washington, D.C.: U.S. Govt. Printing Office. 8vo. **205**

The research projects of the Bureau of Animal Industry cover a wide field, some being directed to the solution of special wartime problems. The Bureau's drive for the elimination of bovine TB. is nearing completion and the eradication of cattle ticks is 99% complete. At the end of the fiscal year, 591 counties in 22 states were designated as "modified accredited Bang's-disease-free" areas, indicating their practical freedom from the disease.

ANIMAL HUSBANDRY DIVISION (MCPHEE, H. C.).—Studies on meat dehydration showed that TRICHINAE are killed in meat dehydrated to 3% moisture content at temperatures of 102°–120°C. but not when dried to 3% at 70°C. Defluorinated rock phosphate was tested as a substitute for bone meal in stock feeding. It was found that the degree of heat used in defluorinating

the product affected the feeding value. When it was heated to 600°–700°C. poor results were obtained in feeding tests, but when heated to 1010°C. the product was almost as good as bone meal. Experiments on the feeding of beef cattle showed that market grade is adversely affected by feeding a low level of concentrates. Yellow corn is generally considered to be an important source of vitamin A in farm animal nutrition but investigations showed that cattle fed a balanced ration containing 11–14 lb. of yellow corn with oat straw as roughage developed symptoms of VITAMIN A DEFICIENCY. Various other nutrition experiments are described, including the use of chopped sugar cane as roughage for fattening steers, the wintering of beef cows on forest pasture, the use of distillery products for beef production and "sorgo" as a source of carotene. Details are given of breeding experiments on the improvement of beef production in cattle and on wool type in sheep. Cross-breeding experiments were carried out on swine.

A 20-year study of the occurrence of HERMAPHRODITISM in Saanen and Toggenburg goats revealed that hermaphroditism and the hornless character are closely correlated. The results indicate that hermaphroditism can be bred out of goat herds by using one horned parent at each mating. Nutrition experiments demonstrated that animal protein may be omitted from pig rations. LOCOMOTOR INCOORDINATION in pigs may be prevented by the addition to the ration of 0·5 mg. of calcium pantothenate and 0·15 mg. of pyridoxine per kg. body weight. Studies on the effect of the roughage level on the utilization of food by horses showed a high correlation between decreasing fibre content and increasing digestibility of the ration. This enables a reduction in the weight and volume of the ration to be made, thus facilitating the transport of horse rations in the field. It has been found possible to increase the resistance of chicks to LYMPHOMATOSIS by breeding and it has been shown that the crossing of inbred chicks increases egg production of the progeny. Breeding can also influence the deterioration rate of egg white and shell quality. Animal protein was shown not to be essential in the diet of growing poultry and egg production is not affected by the fat content of the diet. Studies were made on the hormonal control of egg production. During the year there has been increased participation in the National Poultry Improvement Plan designed to improve the production and breeding qualities of poultry and to reduce mortality from PULLORUM DISEASE.

RESEARCH IN ANIMAL DISEASES (SCHOENING, H. W.).—A preliminary investigation on the use of penicillin in the control of BOVINE MASTITIS (*Streptococcus agalactiae* infection) has given encouraging results. The viability of *Bacillus anthracis* was studied. Studies have been made on the use of products obtained by the chemical treatment of johnin and tuberculin for the diagnosis of JOHNE'S DISEASE. Satisfactory results have been obtained with vaccine against SWINE ERYSIPELAS. No conclusions could be drawn from tests on the ability of the bacteriophage to modify the course of PARATYPHOID infection in pigs. A bacteriophage capable of attacking *Salmonella cholerae-suis* was found in the faeces of pigs. Improved media for the preparation of stained antigens for use in PULLORUM DISEASE control have been produced. Investigations have begun on FOWL TYPHOID, including work on modes of transmission, serology, diagnosis and methods of control. A study is being carried out on the duration of the resistance against BRUCELLOSIS induced in cattle vaccinated with strain 19 as calves. With intradermal vaccination of minute doses of the vaccine the blood titre and blood opsonic index appeared to be of the same degree as those produced by the subcutaneous injection of a 5 ml. dose. Tests are in progress to discover the degree of persistence of immunity after intradermal vaccination. Food and drink were shown to be factors in the spread of SWINE BRUCELLOSIS. The blood agglutination test was shown to be unreliable as an aid to the diagnosis of this disease in individual animals, but useful for detecting the disease in a herd. An outbreak of VESICULAR STOMATITIS occurred in pigs in a swine fever serum plant, a disease not previously reported as occurring naturally in pigs, although they are known to be susceptible to artificial inoculation. Vesicular stomatitis and foot and mouth disease can be differentiated by intramuscular inoculation of cattle; the virus of vesicular stomatitis produces no lesions but F. & M. disease virus produces typical F. & M. disease lesions. The inoculation of sheep on the tongue also serves to distinguish the two diseases, no lesions being produced by vesicular stomatitis virus. 4,768 cases of EQUINE ENCEPHALOMYELITIS were reported during the year 1944; this is slightly less than during the previous year. Studies on EQUINE INFECTIOUS ANAEMIA have shown that colts from suckling age to 2 years are as susceptible as adult horses. Milk from infected mares contained the virus, but saliva and urine from an acute case did not. Studies have been made on improved methods of preserving the virus. Work during the year showed that SWINE FEVER crystal-violet vaccine produced by using glycerol in place of disodium phosphate was not contaminated by micro-organisms, whilst vaccine produced using the disodium phosphate was occasionally found to be contaminated. Studies on the transmission of AVIAN LYMPHOMATOSIS have been made. Investigations on the transmission, pathology, and immunity of a transmissible tumour producing lymphomatosis-like lesions have been carried out.

ZOOLOGICAL DIVISION (SCHWARTZ, B.).—The artificial infection of calves with *Eimeria bovis* has been studied. Thirteen boron compounds were tested against *E. tenella* infection in poultry and five gave protection against the disease. Sodium borate was found to be as effective as any of the compounds tested. It has been shown that ANAPLASMOSIS may be transmitted to susceptible bovines by carrier cattle. *Sarcocystis miescheriana* of swine was shown to be transmissible to rodents, cats, dogs and chicks. Phenothiazine in salt has been tried as a remedy for STRONGYLOSIS in horses. 10% phenothiazine-salt mixture is unpalatable for horses. When fed in a mixture of one part phenothiazine to 19 parts salt for 64 days, 1·2 g. of phenothiazine were consumed per day; when a 1 : 30 phenothiazine-salt mixture was fed 1·4 g. per day were consumed. Observation on the animals fed in this way revealed no reduction in the worm burden, but 1 : 40 and 1 : 49 mixtures tested on five and ten animals respectively gave satisfactory results. A hexachlorethane-bentonite suspension was tested against liver flukes in 4,200 cattle and satisfactory results were obtained. More detailed experiments on 476 infected cattle, including the P.M. examination of 34, demonstrated the efficiency of the treatment. Hookworms (*Bunostomum trigonocephalum*) have been shown to produce loss of weight and anaemia in sheep. Phenothiazine in doses of 0·4–0·9 g. per lb. body weight has been found to produce no permanent injury in calves on a good diet although calves receiving the larger dose show symptoms of intoxication for 24–48 hours after dosage. 1 : 9 phenothiazine-salt mixtures were confirmed as effective in controlling intestinal parasites in sheep and the treatment had no deleterious effect on wool production, fertility of the stock or growth of the lambs. 1 : 9 phenothiazine-salt mixture was tested for con-

trolling parasitism in goats and although *Haemonchus contortus* was not eliminated entirely, the egg count was low and *Trichostrongylus* spp. were effectively controlled. Preliminary tests suggest that sodium fluoride is effective against swine ascarids. Perthiocyanic acid has been found to be effective in removing *Taenia* and *Dipylidium* from dogs and *p*-tertiary-butyl phenol was effective against hookworms and ascarids and partially effective against whipworms. Dusts containing rotenone were of value in the control of ox warbles. Nicotine adsorbed on bentonite was used as an experimental dip for sheep ticks, but only temporarily reduced the extent of the infestation and did not eliminate ticks at a single dipping as did derris and cube dips.

FIELD INSPECTION DIVISION (FLADNESS, S. O.).—Only sporadic outbreaks of ANTHRAX have occurred and DOURINE of the horse has been greatly reduced. Eradication of SHEEP SCAB has begun and CATTLE MANGE is almost eradicated.

INTERSTATE INSPECTION DIVISION (MACKELLAR, W. M.).—Work was carried on for the control of SWINE ERYSIPELAS and SWINE FEVER, and further progress was made with TICK ERADICATION. Supervision of the transport and quarantine laws was carried out.

TUBERCULOSIS ERADICATION DIVISION (WIGHT, A. E.).—Large numbers of cattle were tested in the TB. control scheme. 6,153,069 herds containing 64,519,652 cattle are under supervision for the control of TB. The survey of poultry flocks in connexion with cattle testing for TB. was continued and eradication work was begun on AVIAN TB. in the Mid-Western and North Central States where the disease is most prevalent. Of 2,578 cattle tested for infection with JOHNE'S DISEASE, 3·2% reacted and were condemned. Wartime shortage of veterinarians has held up the BRUCELLOSIS eradication programme. During the year, 5,235,912 blood tests were made, 4·3% being positive. Five hundred and ninety-one counties in 22 states containing 5,565,000 dairy and breeding cattle in which reactions do not exceed 1% are "modified accredited areas". Compensation is paid for animals slaughtered. During the year, 392,232 calv were vaccinated with strain 19.

DIVISION OF VIRUS-SERUM CONTROL (SKIDMOR D. I.).—The supervision of 73 licensed establishmen producing biological products for use in animals carried out by this division, which also supervised t potency and purity of the biological products produce —T. E. (

U.S.A. (1945.) **Report to the Montana Livesto Sanitary Board December 1, 1943 to November 3 1944.** [BUTLER, W. J.] pp. 21. 4to. Mimeographe 2

The report stresses the importance of the livesto industry in Montana and hence the importance of ad quate veterinary services. Owing to the enormo distances which have to be covered to reach isolat farms, it is suggested that veterinarians in priva practice be given a state subsidy to enable them to car out their work. The incidence of various diseases Montana amply justifies the provision of adequa finances for both routine veterinary inspection ar research. Details are given of the number of cases various diseases reported during the year; the mo interesting points recorded are as follows. Montana a modified accredited tuberculosis free area; durin 1943 only three cases of TB. were found in the who state whilst nine were found during 1944. Blood testin in connexion with the control of BRUCELLOSIS w carried out during the year. SHEEP SCAB is absent fro Montana, but INTESTINAL PARASITES are a serious pro lem to sheep farmers. The use of 1 : 10 phenothiazin salt mixture is recommended for control of the conditio and supplementary feeding is also advised. RABIES not present in Montana. Routine meat and dai inspections were carried out during the year. Tabl at the end of the report detail the examinations carrie out during the year in the Pathological and Bacteri logical Laboratory and the Chemical Laboratory. A li of investigations carried out co-operatively with the U. Bureau of Animal Industry is also appended.—T. E. (

See also abstr. **89** (trichinosis survey, California, 1940–41), 2 (Leverhulme Trust, West Africa Commission, 1938–39).

BOOK REVIEW

CABLE, R. M. [Associate Professor of Parasitology, School of Science, Purdue University.] (1943.) **An illustrated laboratory manual of parasitology.** pp. vi + 112. Minneapolis, Minn.: Burgess Publishing Co. Revised edit. 4to. 207

Although this manual, at first intended for use in C.'s rather small classes, is designed primarily for pre-medical students, it also includes a wide variety of parasites of interest to students of zoology, entomology and veterinary science. The protozoan, helminth and arthropod groups are represented and each receives adequate treatment. The parasites are dealt with from a comparative point of view and life-histories are studied as general types. Over 100 well labelled diagrams are intended to allow the student more time to concentrate on the actual study of specimens, since C. found that members of a class with a limited zoological background found it both difficult and discouraging to have to become sufficiently familiar with the various kinds of parasites to make much practical use of their training unless written directions were widely supplemented with illustrations, charts, or other graphic aids. About 70 selected references to the main text-books and other publications on parasitology are grouped at the beginning of the manual. Part 1 deals briefly with zoological classification and nomenclatur an outline classification of the major groups containin animal parasites, and methods of measuring microscop objects. Parts 2, 3, and 4 deal respectively with prot zoology, including the construction and use of a zoolog cal key to genera and species, helminthology and leeche and entomology. Part 5 is devoted to laboratory metho and micro-technique such as faecal examinations, use the Baermann apparatus, detection of tissue parasite P.M. examination of animals for parasites, and the pr paration of permanent mounts, smears and material f sectioning. An appendix contains a useful list of th more important reagents and solutions used in parasit logical techniques. An adequate index completes th manual.

As a laboratory guide this publication appears fulfil its function remarkably well. It is not ove burdened with long verbal descriptions nor with to many species of parasites. The illustrations throgho show sufficient morphological features for identificatio purposes without being unnecessarily detailed. Mis prints and errors are practically non-existent.—J. N. (

See also abstr. **122** (annual review of physiology), **123** (annual revie of biochemical and allied research in India).

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